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CATALYZING CHANGE: HOW ENTERPRISE H PIONEERS DIGITAL TRANSFORMATION IN MANUFACTURING

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Abstract: In the wake of the pervasive influence of Internet technology across industries, traditional economies are undergoing a profound shift towards the digital age. In this transformative landscape, the manufacturing sector, a cornerstone of China's economy, is taking center stage. China's ambitious Made in China 2025 initiative, launched in 2015, has set forth a visionary roadmap aimed at catapulting the nation into a global manufacturing powerhouse by 2050. This multifaceted strategy envisions China's ascent from a manufacturing force to a medium-level manufacturing power by 2035 and eventually culminating in world leadership in manufacturing.

To realize these lofty goals, Chinese manufacturing enterprises have embarked on a digital transformation journey. This endeavor is not only pivotal for bolstering the foundational pillars of the industrial and supply chains but also equipping the sector to navigate the turbulent waters of today's fast-changing global landscape. Furthermore, digital transformation is seen as a linchpin for enhancing efficiency and quality across the sector.

This paper delves into the intricacies of this digital transformation within China's manufacturing industry, shedding light on its manifold implications and significance. Through a comprehensive exploration of the digitalization process, this study seeks to provide valuable insights into how this transformation is shaping the future of manufacturing in China.

Keywords: Digital transformation, manufacturing industry, Made in China 2025, efficiency, supply chain.

Introduction

As Internet technology penetrates various industries, the traditional economy has ushered in the era of the digital economy while many countries are promoting digital development strategies. As one of the most important industries in China, the manufacturing industry lays the foundation for the national economy, playing a critical role in development. China pioneered the Made in China 2025 plan as early as 2015 to achieve better development and transformation in a fresh setup of the world economy, striving to become a manufacturing power by 2025, a medium-level manufacturing power by 2035, and a worldleading manufacturing power by 2050. Since then, traditional Chinese manufacturing enterprises have been gradually undergoing digital transformation and upgrading, which is conducive to strengthening the foundation to ensure the safety and stability of the industrial chain and supply chain, and to effectively cope with major risks and external shocks as a key means to improve their efficiency and quality. (As shown in figure 1)

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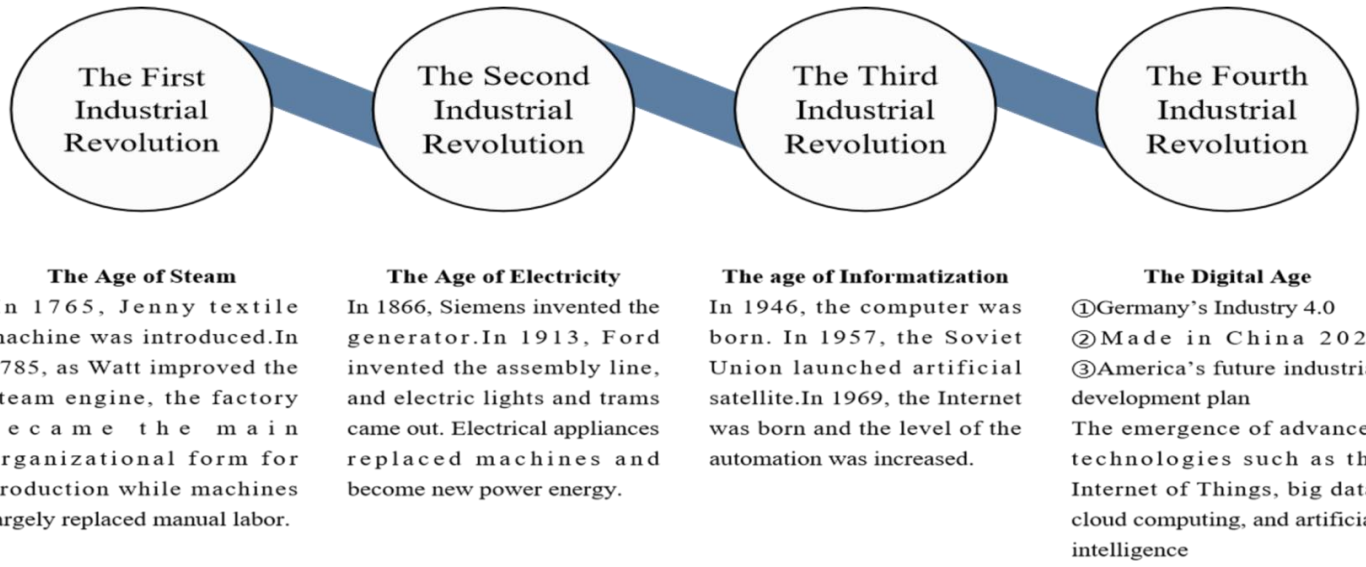

Figure 1. History of the four industrial revolutions[1]

1. Definition and features of digital transformation

2.1 Definition of digital transformation

This paper defines digitization from an economic perspective as a radical change process in which a series of strategic production functions constantly transform from a lower to a higher form triggered by digital technology and a production function first occurred probably in a sector will further evolve into a new production function in a dominant form.[2] Specifically: (1) Data as a new production factor join the manufacturing production function, and update the production function. This process may first occur in such manufacturing sectors as the computer, communication and electronic equipment, instrumentation, culture and education, industrial art, sports, and recreational goods and gradually spread to other manufacturing sectors. (2) Digital technologies such as artificial intelligence and cloud computing not only update traditional production technologies, but also prompt new forms of digital production factors including new labors like industrial robots in the manufacturing industry, new soil like digital twins, new capitals like intelligent finance, and new concepts like cloud-native architecture by integration with traditional production factors such as labor, capital, land, and institutions. (3) The production of digital products changes the economic law of increasing marginal costs and achieves excessive profits in the production with increasing returns and scale. Manufacturing digitization has an innovation-enabling and performance-enhancing effect from technological progress and improved factor-allocation efficiency and an inductive effect on related industries in global network production, thus coming to the digitization of all manufacturing sectors eventually.

2.2 Features of digital transformation

2.2.1 Convergence

Digital technology as an enabling technology can help traditional enterprises to improve their productivity, products, and services. Although digital transformation requires enterprises to have new capabilities, enterprises should not completely abandon their original capabilities. They must realize the integration of digital technology with the way of thinking and current business processes.

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2.2.2 Leap-Frogging

For most traditional manufacturing enterprises, digitization requires new digital technologies in order to cross the Digital Divide and capabilities to accept and use these technologies and the Internet thinking, which is very different from the resources and organizational practices developed by them in the past. Therefore, the core of the capabilities is that they must cross the existing value chain and open up new value spaces to complete digital transformation.

2.2.3 Environmental dependence

The change in enterprises is affected by their environment. With the rapid development of digital technology, their capabilities, paths, and approaches must adapt to their environment. Meanwhile, the market and social environment are changing as the competitors and consumers are changing dramatically influenced by growing digital technology.

3. The impact ways of digitization on the change management in manufacturing enterprises

The digital economy promotes quality development of the manufacturing industry by affecting new factor inputs and capital deepening. Specifically, inputting more factors, improving the efficiency of factor production, and technology spillover will achieve higher production efficiency of capital input in the manufacturing industry.

First, the input of data new factors. In the context of the digital economy, we can get more accurate data factors from diversified sources in real-time as the efficiency of factor allocation is increasing. Therefore, data is included in the macro production function as a new type of production factor. The study by Hu Beibei and Wang Shengguang (2017)[3] argued that data has three core features to become a key factor of production: a continuous decrease in production costs, a near-infinite supply capacity, and widespread application and development prospects by attempting to deconstruct the production function under the new technological conditions. (As shown in figure 2)

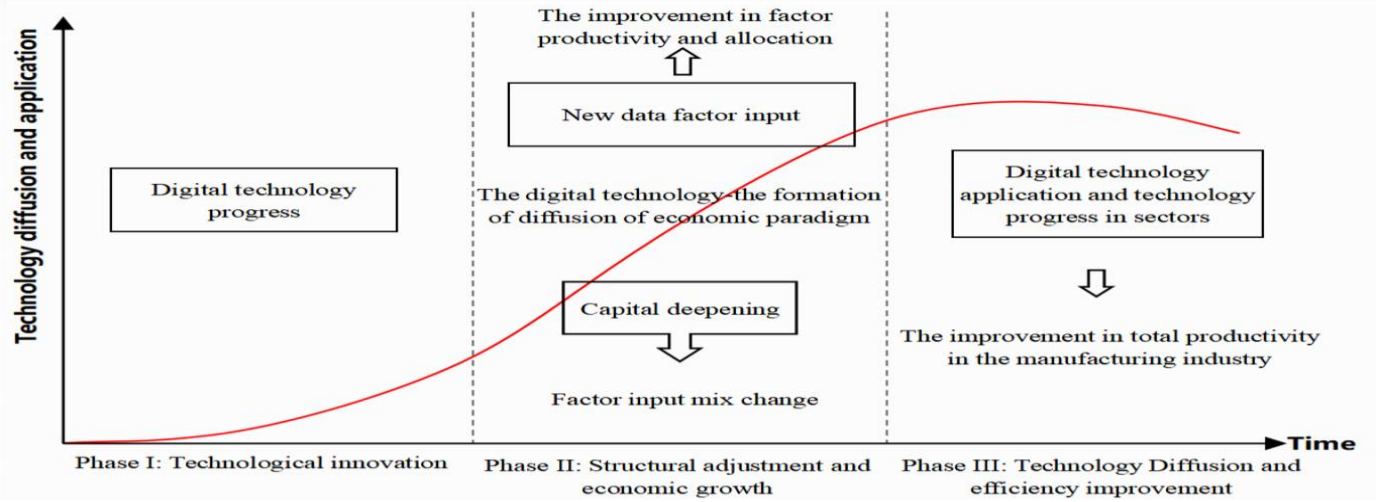

Figure 2. S-curve theoretical analysis framework for the digital technology-economy paradigm[4]

Second, the deepening of the capital. Emerging technologies, industries, models, and business models, as well as the promotion of new infrastructure strategies, are related to economic and social development and the optimization and upgrading of the industrial structure. With fast progress in information technology under Moore's Law, costs of supply of digital products and reproduction and dissemination of data have declined significantly, enabling an unlimited supply of digital products

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to all types of producers and consumers over a long period. The increase in demand for digital products and services continues to drive the transformation of the traditional manufacturing industry, thus improving the production efficiency of capital input in the manufacturing industry to promote the high-quality development of this industry through developing the digital economy.

Third, the innovation effect of business models. According to Schumpeter (1912)[5], innovation is essentially building a new production function with the core of the innovation mix for production factors. Business model innovation occurs when a new production factor formed by the integration of data as a new production factor and digital technology and original production factors is introduced into the production function. Digitization has deeply shocked the business model of manufacturing enterprises, with major changes in production technology, production organization methods, enterprise management methods, and competition strategies, and the gradual formation of a new model for intelligent manufacturing. Specifically, in terms of production activities, a mass customization production model has formed: the production model of the manufacturing industry changes from a mass production model focusing on economies of scale to a mass customization production model balancing economies of scale and customer needs, focusing on value-added product design. (As shown in figure 3)

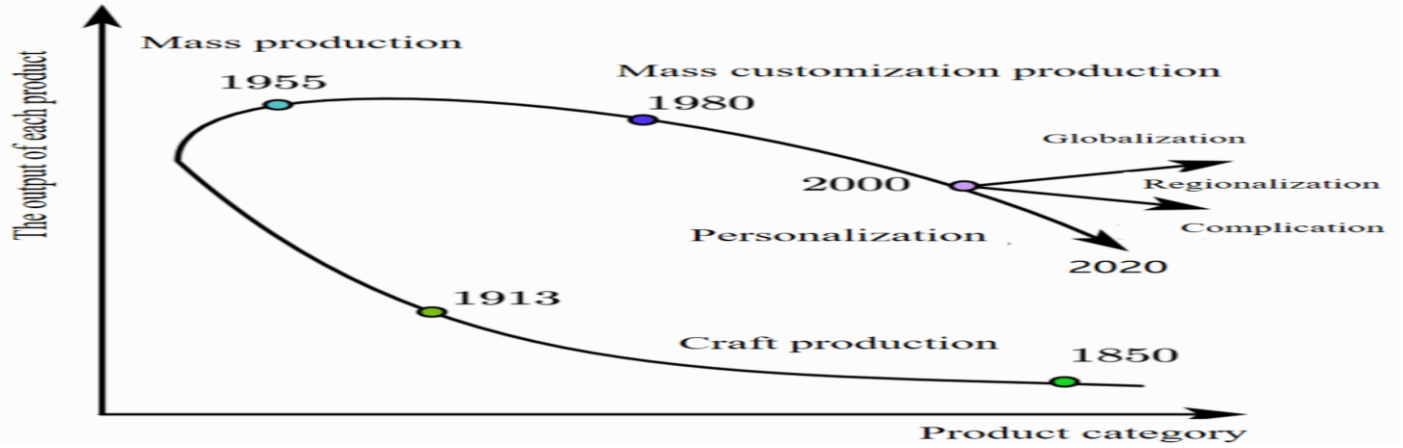

Figure 3. The evolution of production models in the manufacturing industry

4. A case study——enterprise H

4.1 Case overview

Founded in 1984 in Qingdao, Shandong Province, enterprise H Enterprises specializes in the research, development, production, and sales of such intelligent home appliances as refrigerators or freezers, washing machines, air conditioners, water heaters, kitchen appliances, and small appliances, as well as smart home scenario solutions with a good vision that bringing full-scenario smart home appliance experience by providing diversified products, brands, and solutions to meet personal demand of users in a good life. As of 2020, with 10+N innovation ecosystems, 29 industrial parks, 122 manufacturing centers, and 240,000 sales networks in the world, enterprise H has spread its businesses into 160 countries and

regions and employed nearly 100,000 staff, ranking the Global Fortune 500 for four consecutive years.[6]

Before the transformation in 2012, enterprise H focused on building itself into a world-renowned Chinese brand with an internalization strategy. Since 2012, especially in 2019, it has committed to

transforming from a product-oriented brand in the traditional era to an ecological-oriented brand in the Internet of Things era based on strategies of network and ecological brands. Guided by this philosophy, it is actively developing the experience economy. As a result, in 2020, as one of the leading companies in the home appliance industry, it reached 209.7 billion RMB in sales, with total assets of 203.5 billion RMB. In 2022, it will also continue to invest in digital upgrading, talent building, and future innovation models: implementing digital re-engineering focused on experience and the connection between scenarios and users to improve operational efficiency; driving up profitability across categories as innovative design and Internet of Things technology as an entry point to constantly upgrade smart home solutions.

4.2 Enterprise H Smart Digital Transformation Path

4.2.1 Building HOPE, an open innovation platform for H enterprise, to strengthen R&D and innovation

In October 2013, relying on the management model of the integration of the employee and user value and the open innovation concept of the world can be as our R&D department, enterprise H built an open innovation platform including an online platform, an offline network, and an innovation community, namely the HOPE platform. The platform overturns the original R&D and innovation model: the traditional waterfall R&D is replaced by iterative R&D. It also breaks down the barrier between enterprises and innovation resources, accelerating the flow of knowledge among enterprises, users, and innovators. Since its creation, it continues being upgraded with HOPE 2.0 version in 2014 and evolving into a world-class innovation platform since 2017, bringing world-class global resources worth over $1 million and patent results worth over $30 million now. Therefore, when developing products independently, enterprise H can access network resources to the maximum based on the HOPE platform and achieve zero-distance interaction with global users and resource matching between a source of innovation and innovation transformation for smart home, thus creating disruptively innovative products such as MSA oxygen-controlled fresh refrigerator, clean water washing machine, and Tianzun air conditioner. Meanwhile, enterprise H can share technology and product solutions across regions and enhance R&D efficiency with the help of this platform. For example, in the R&D of a large drum washing machine, the time is reduced by 55%, and the employee involved in the R&D is reduced by 33% as it enhances R&D and innovation capabilities.

4.2.2 Upgrading the model of the integration of the employee and user value and giving its new connotation for joint innovation and win-win cooperation

In 2015, Enterprise H proposed a model of the integration of the employee and user value for joint innovation and win-win cooperation in the smart home. As early as 2005, it proposed this model and changed the original huge organizational structure under a new concept. After starting a digital transformation in 2013, it gave a new connotation to this model-the integration of employee and user value after upgrading which means that the value of the employee integrates with the value that they bring to their customers. this new model has overturned the strategy and organizational models of enterprises, reflecting that enterprises have transformed into platforms, employees bring more value to customers, and users have more personal demand. In other words, an enterprise has transformed from a traditional hierarchical organization to a platform for joint innovation and win-win cooperation; employees have become creators and dynamic partners who actively create value

for users with more autonomy from passive executors who receive instructions; users have become participants of the best experience in the whole process and are not just customers but interactive user resources from purchasers. Ultimately, an inverted-triangle organizational structure has been formed in which there has a near-zero distance between enterprises and their users with several value platforms. Enterprise H had 100.6 billion RMB in revenue from overseas markets, an 8.8% increase including 15.8% growth in the second half of 2020. On the surface, its ecological and strategic management capabilities have been strengthened.

4.2.3 Building connected factories to improve smart manufacturing

In 2015, H Enterprises built its first Connected Factory, an innovative exploration turning mass production to mass customization in response to the global new industrial revolution and the trend of the Internet era. This factory consists of 1+7 platforms: the number 1 means a smart-life platform for providing users with smart life solutions and services and for building a new business model; the number 7 means platforms of interactive customization, open innovation, virtual marketing, modular procurement, smart manufacturing, smart logistics, and smart connected services for building mass customization and flexible production capacity through disruptive innovation in the whole process. As a result, the Connected Factory also achieved connection with users, successful transformation in focus from enterprise to users, and production and sales integration by creating effective demand and supply to bring the best experience in convergence, transparency, and visualization to users. Judging from this, the operation of the Connected Factory has promoted the transformation from large-scale production to lean and flexible production and helped the enterprise enhance its intelligent manufacturing capability.

5. Conclusion

In digital transformation, enterprise H has broadened channels for accessing various resources through data empowerment and building industrial internet platforms; it has renewed its business philosophy, readjusted organizational structure, and improved the performance in taping customer demand, and customization on request, mass manufacturing, and flexible production of products by spreading the concept of openness and sharing, laying out an online-offline new retail model, and building an ecosystem. Through the above approaches, its corresponding capabilities in strategy, organizational management, and business have been enhanced, which helps promote its transformation from a traditional manufacturing enterprise to a platform enterprise and improve its core competitiveness.

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