

Digital Transformation of Jiaozuo Manufacturing Enterprises and Countermeasures

Yujie Guan^{1,*}

¹ Economics Research Center, School of Business Administration, Henan Polytechnic University; Jiaozuo 454003, China

* Corresponding author: Yujie Guan (Email: guanyujie919@163.com)

Abstract: In the backdrop of the "digital economy," digitization has exerted profound impacts on various aspects of manufacturing enterprises, including production and operations, deeming digital transformation an inevitable trend for their sustained development. This paper delves into this trend through extensive research, providing a detailed exposition of the relevant policy measures and guidance proposed by local governments to drive the digital transformation of the manufacturing industry. Simultaneously, by conducting a thorough analysis of the current status of digital transformation in manufacturing enterprises in Jiaozuo City, the paper unveils numerous challenges and obstacles encountered during the ongoing transformation process. Based on a comprehensive analysis of the current situation, this paper aims to present a series of specific strategies to propel the digital transformation of manufacturing enterprises, with the ultimate goal of assisting these enterprises in better adapting to the requirements of the digital era and providing robust support for their sustainable development.

Keywords: Manufacturing Industry, Digital Transformation, Path Breakthrough.

1. Introduction

In the era of the digital economy, the development of digital economy has transitioned from the realm of consumer life to the manufacturing sector. The digitization transformation, with the overarching goal of achieving manufacturing industry upgrade through the comprehensive integration of emerging technologies into various facets of enterprise production, manufacturing, and operational management, is emerging as a significant trend in the development of the manufacturing industry^[1-3]. For manufacturing enterprises, digital transformation entails the holistic incorporation of new information, modern management information, and production technology means, effectively applied across all aspects of enterprise operations^[4-5]. Due to the pervasive integration and infiltration of digital information technology with traditional manufacturing enterprises, not only have the original boundaries between traditional industries become blurred, but the transformation has also disrupted conventional resource allocation methods, product combinations, and methods of value innovation. This has the potential to facilitate a comprehensive transformation, innovation, and elevation of traditional manufacturing enterprises, thereby reshaping the future industrial landscape.

In recent years, as part of the strategic deployment to deeply implement the relevant decisions of the Central Committee of the Communist Party of China, Henan Province has identified "promoting the high-quality development of manufacturing" as a crucial lever to foster stable industrial growth. To drive the high-quality development of the manufacturing industry, it is imperative to seize the development opportunities of the digital economy era and actively advance the digital transformation of manufacturing production, with a focus on the deep integration of next-generation information technology and modern industry^[6-7]. Jiaozuo City, as a major comprehensive industrial city in northern Henan, possesses a solid manufacturing foundation and a complete range of industries, holding a significant position in the national economy. Investigating the current

status and existing issues of its manufacturing industry's digital transformation not only further promotes the digital transformation of manufacturing enterprises in Jiaozuo City but also provides important insights for Henan Province to leap from a manufacturing powerhouse to an advanced manufacturing stronghold.

2. Current Status of Digital Transformation in Manufacturing Enterprises in Jiaozuo City

Under the background of a new round of scientific and technological revolution and industrial transformation, Jiaozuo Municipal Party Committee and Government, based on the actual industry of Jiaozuo, accelerated the transformation and upgrading of manufacturing industry, highlighted the "two-wheel drive" of industrial digitalization and digital industrialization, vigorously implemented the action of "using wisdom with numbers", and promoted the integrated development of the new generation of information technology and manufacturing industry. The digital transformation of manufacturing enterprises has become a key move to adjust the industrial structure of Jiaozuo City, promote the transformation and upgrading, enhance the comprehensive competitiveness of the city, and build a "high-quality transformation demonstration city".

2.1. Rapid Development of Advanced Manufacturing Industry

Advanced manufacturing is relative to the traditional manufacturing, manufacturing constantly absorbing electronic information, computer, and modern management technology of high and new technology achievements, and the advanced manufacturing technology integrated application in manufacturing products research and development design, manufacturing, online testing, marketing services and management of the whole process, from the traditional manufacturing to the development of advanced manufacturing, for the manufacturing enterprise

digital transformation cushion under a solid foundation. Up to now, there are 329 industrial enterprises above designated size in the city, advanced manufacturing enterprises, accounting for 27.3% of the number of industrial enterprises above designated size; the realized added value accounts for 13.8% of the industries above designated size, with a growth rate of 14.6%, 7.6 percentage points higher than the industries above designated size, and contributing 26.7% to the growth of industries above designated size^[8]. Advanced manufacturing industry with its production technology, manufacturing mode and other aspects of innovation, leading the manufacturing industry gradually to the high-end forward.

2.2. Preliminary Efficacy of Intelligent Transformation Evident

Jiaozuo active into a new round of the science and technology revolution and industrial revolution, speed up the implementation of intelligent manufacturing as the leading "three transformation", through the leading enterprises tree benchmarking demonstration, key industries, small and medium-sized enterprises and standard application, a high starting point positioning, in the province to the advanced, be advanced, with "wisdom" made can thousands of industries, promote the development of Jiaozuo manufacturing high quality. Jiaozuo has successively cultivated three intelligent benchmark enterprises in the province, namely, Zhongyuan Internal Distribution and Jiaozuo Mengniu, and the proportion of intelligent transformation of enterprises above the scale in the city ranks first in the province^[9]. Jiaozuo seize new infrastructure opportunities, with 5G scenario application for breakthrough, speed up the digital, networked, intelligent technology application in various fields, the construction of eastern commercial concrete industrial park, Jiaozuo mengniu 125G factory, new into the national manufacturing and Internet integration development demonstration enterprise 1, provincial intelligent factory (workshop) six, five enterprises in the provincial manufacturing enterprises^[3].

2.3. Commencement of Construction for "5G + Industrial Internet" Initiatives

Against the backdrop of the new wave of technological revolution and industrial transformation, the seamless integration of 5G and Industrial Internet platforms, as a profound fusion between industrial and internet systems, emerges as a crucial pillar and safeguard for the digital transformation of manufacturing enterprises. According to Gao Kunpeng, the Secretary of the Party Committee and General Manager of Jiaozuo Mobile, in recent years, Jiaozuo Mobile has strategically harnessed the pivotal role of 5G in Jiaozuo's development, diligently advancing the three-year action plan for 5G industrial development. This concerted effort has propelled Jiaozuo to the forefront of the province in terms of both 5G network construction and industrial development. As of now, Jiaozuo Mobile has cumulatively invested 280 million yuan, establishing 890 5G base stations. Continuous coverage has been achieved in the main urban area of Jiaozuo, as well as in Zhongzhan District and Macun District, with ongoing construction of 5G base stations in various county towns. The application of 5G has notably empowered the Industrial Internet.

Jiaozuo Mobile has collaboratively engaged with key manufacturing enterprises such as Jiaomei Group, Zhongyuan Neipei, Longmang Baililian, and Duofudu, forging

cooperative consensus to jointly create industry applications like "5G Green Unmanned Mines," "5G Smart Factories," and "5G Industrial Internet Platforms." The objective is to strive for the establishment of a batch of distinctive demonstration projects. Notably, the "5G Smart Factory" jointly promoted with Zhongyuan Neipei has become one of the five leading projects within the China Mobile Group. Moreover, the "5G Green Unmanned Mines" project, in collaboration with Jiaomei Group, stands as the first officially commercialized demonstration project of its kind in the province, representing a pioneering large-scale application nationwide^[10].

The 12th Second Plenary Session of the Municipal Party Committee and the Economic Work Conference of the Municipal Party Committee explicitly proposed the initiation of pilot demonstration projects for "5G + Industrial Internet," thereby providing clear direction for Jiaozuo City in successfully navigating the path of digital transformation in the manufacturing industry.

3. Challenges in the Digital Transformation of Manufacturing Enterprises

At present, the rise of the digital economy and the development of manufacturing quality, to Jiaozuo manufacturing enterprise digital transformation brought a good opportunity, but two fusion level is not high, intelligent manufacturing research, lack of senior talents and digital transformation speed gap has been restricting the Jiaozuo manufacturing enterprise digital transformation.

3.1. Limited Degree of Integration between Informatization and Industrialization

The integration of the two industries can effectively promote the modernization of the production process and the manufacturing service system, and improve the output efficiency and competitiveness of the manufacturing industry^[11]. Therefore, the integration of the two is the only way to realize the manufacturing industry's digital transformation. The automation and digitalization level of manufacturing enterprises in Jiaozuo city is relatively weak, and the ability of manufacturing modernization is still in the application and development stage on the whole, which obviously affects the deepening of digital transformation. According to the 2020 Jiaozuo Statistical Yearbook, Jiaozuo industrial cloud experience center and enterprise cloud public service platform, and only 74 enterprises integrate the two standards. Although the speed of intelligent transformation of some large leading enterprises in Jiaozuo has been improved, there are still some enterprises that lack independent data center computer room, and the design of the computer room of some enterprises does not meet the requirements of technical specifications. The lag of production facilities and Internet infrastructure will inevitably affect data collection and equipment interconnection, and seriously restrict the process of digital transformation of manufacturing enterprises.

3.2. Insufficient Research and Development Investment in Manufacturing Industry Intelligence

Digital transformation is a systematic project, studying electronic product design, electronic company management mode, automation of enterprise manufacturing equipment, each of which must invest huge research funds. But Jiaozuo

city manufacturing industry digital, intelligent research and development field strength is not big enough^[12]. Take 2020 as an example, from the perspective of the research efforts in various industrial fields of our province in 2020, the scientific research institutions and universities in our province are mainly concentrated in Zhengzhou, the provincial capital, and the R & D investment in Zhengzhou, Luoyang and Xinxiang accounts for 54% of the total R & D investment of the province. The research investment ranking of Jiaozuo is in the middle level, so that it cannot produce outstanding core competitive advantages in the field of high-end manufacturing and intelligent manufacturing, lacks industrial agglomeration belt that can promote local economic construction, and lacks initiative in industrial transformation and upgrading of enterprises.

3.3. Scarcity of Composite High-end Talents

As the digital transformation process of manufacturing enterprises covers many fields such as software, electronics and quality management, high-quality composite professionals are an important guarantee for realizing the digital transformation of manufacturing industry^[13]. In the current process of digital transformation of manufacturing enterprises, due to the rapid improvement of the social requirements for professional digital technical talents, leading to the shortage of digital talent training resources and the backward construction of talent team. This has become the Jiaozuo city manufacturing enterprises digital transformation of the obvious short board. At present, only Henan Polytechnic University has been approved to establish data science and big data technology majors in Jiaozuo area, which means that technical workers engaged in data processing technology and big data operation and maintenance will have a huge gap in a period of time, which cannot provide strong support for the digital transformation of traditional manufacturing industry. Compared with popular cities, Jiaozuo city is obviously more difficult in talent absorption. With the extensive use of digital information technology, the shortage of professional talents will become more and more prominent.

3.4. Disparities in the Progress of Digital Transformation

With the further implementation of enterprise digital transformation, Jiaozuo manufacturing enterprises of intelligent upgrade understanding also gradually enhanced, many production leading enterprises have entered the digital, Internet, intelligent stage, and for many small and medium enterprises, the implementation of digital upgrade means must reshape the enterprise organization and process, in the current small and medium-sized enterprises general financing situation is nervous, the implementation of digital transformation will have a lot of enterprise internal pressure, these enterprises choose to postpone intelligent construction project investment, or even not to consider. The excessive gap in the progress of digital transformation has caused the weak overall digital foundation of the city's manufacturing industry^[14].

4. Strategic Recommendations for the Digital Transformation of Manufacturing Enterprises

With the rise of "digital economy", promoting the digital

transformation of manufacturing enterprises has become the main direction of promoting the manufacturing industry and high-quality development in various regions. At present, the digital transformation of manufacturing enterprises in the city is still in the initial stage, and there is still a lot of room for improvement in the digital degree of enterprises. We should seize the current strategic opportunity period of digital economy and social construction, and actively promote the digital transformation, so as to realize the high-quality development of manufacturing enterprises.

4.1. Elevating the Level of Integrated Development, with a Focus on Cultivating Novel Manufacturing Models

First of all, to carry out industrial information management demonstration projects, support a batch of industrialization and information integration management standard projects, and organize the implementation of various publicity and training activities, in order to promote the two integration management standard work from the pilot popularization to the overall popularization of the transition. We will deepen the integration of the Internet in manufacturing, actively create platforms for mass entrepreneurship and innovation on the manufacturing Internet, and develop pilot and demonstration enterprises in service-oriented manufacturing. Secondly, to promote industrial intelligent transformation. Develop intelligent transformation focusing on "equipment core change", actively guide qualified technology companies to lead and actively participate in the formulation of intelligent manufacturing technology standards, undertake the national comprehensive standardization and innovation mode application of intelligent manufacturing, and intelligent manufacturing pilot demonstration projects. Promote the establishment of a large number of intelligent factories, digital workshops, to form a number of industry competitive system solution providers. Finally, speed up the "enterprise on the cloud". We will actively carry out the "hundreds of thousands of enterprises to the cloud" project, promote some qualified small and medium-sized enterprises to the cloud, reduce the cost of information system construction, improve the application capacity of information technology, and foster new drivers of enterprise development.

4.2. Intensifying Support for Technological Innovation to Foster Technological Advancement in the Manufacturing Industry of Henan Province

Compared with developed cities, manufacturing enterprises in Jiaozuo have poor technological innovation ability, the ability to develop new products is relatively weak, and enterprises lack original technology and products. In view of this, Jiaozuo municipal government must strengthen the support for technological innovation in manufacturing enterprises, encourage manufacturing enterprises to actively pay attention to technological innovation and through practical behavior, in order to implement the innovation-driven development strategy proposed by China. Municipal government to formulate corresponding preferential policies, attract advanced manufacturing enterprises to increase manpower and material resources support the development of new technology and new products, encourage leading enterprises as the core implementation of major science and technology projects, with application major science and

technology projects as the platform construction as the main body of the combination of technology innovation system, to meet the market demand change, the small and medium-sized enterprises to construction into research and development of project investment of market main body, technology innovation activities of market main body and technology innovation use of market main body, support transformation and upgrading of manufacturing industry in Henan province.

4.3. Strengthening Talent Development

On the one hand, strengthen the coordination between enterprises and universities, and through the establishment of graduate workstations and post-doctoral research mobile stations to support the integrated development of industry-university-research enterprises, so as to provide more powerful talent support and guarantee for the digital transformation of manufacturing enterprises. At the same time, a special scientific research mechanism for scholars should be established, and scientific research reports should be prepared regularly as a reference for the government's decision-making level. On the other hand, establish and improve the distribution system and mechanism to promote the innovative development of human resources, and improve the market mechanism of human resources. Support knowledge, technology, management and other factors to participate in the distribution, and retain talents and play their leading role through equity and option incentive and proportional return of generated income.

In addition, actively build technology management system to give full play to the institutions of higher learning and research organs of various resource advantage, build with small and medium-sized enterprises as the main body, market economy as the guide, production closely integration of science and technology innovation management system, the "science and technology-innovative commodities-high-tech companies-market demand" transformation of scientific and technological achievements, establish long-term steady development of joint way. Collaboration platform, focusing on new research organization, give full play to the institutions of higher learning and scientific research institutions, technology and equipment advantage, information resources and theory advantage, establish sharing, sharing risk or cost, steady development of collaborative organization, and promote "market, development, economic benefit, redevelopment" virtuous cycle, further enhance the enterprise continuous innovation ability.

4.4. Cultivating Leading Enterprises to Facilitate the Development of Industrial Clusters

As an industrial organization form that can improve productivity and innovation ability, industrial cluster not only promotes the improvement of efficiency within the cluster, but more importantly, effectively promotes the economic growth^[15-16]. Promoting industrial integration and forming industrial clusters is the inevitable need of Jiaozuo city to accelerate the digital transformation of the manufacturing industry.

The theory of scale economy shows that increasing the production scale of industries can not only reduce the production cost and improve the operating profit, but also optimize the allocation of resources and increase the utilization of resources. Through the demonstration role, leading effect and driving function of leading enterprises, the

extension of the industrial chain can promote the collectivization and agglomeration development mode of manufacturing enterprises, and create conditions for the digital transformation of small and medium-sized enterprises. Actively carry out the cultivation project of leading enterprises in the manufacturing industry of Jiaozuo city, focus on supporting a number of industrial clusters with leading technology, appropriate scale and strong driving force, and drive the speed of the digital transformation of the whole manufacturing industry.

5. Conclusion

This paper has provided an overview of the current state of digital transformation in manufacturing enterprises in Jiaozuo City. The rapid development of advanced manufacturing, initial achievements in intelligent transformation, and the nascent implementation of "5G + Industrial Internet" initiatives were highlighted as key aspects of the existing landscape.

However, a critical examination revealed several challenges hindering the seamless transition toward digitalization. These challenges include the limited integration between informatization and industrialization, insufficient investment in intelligent R&D within the manufacturing sector, a scarcity of composite high-end talents, and significant disparities in the progress of digital transformation across enterprises.

To address these challenges, strategic recommendations have been proposed. These include elevating the level of integrated development, with a focus on nurturing innovative manufacturing models, intensifying support for technological innovation to drive advancements in the manufacturing industry of Henan Province, strengthening talent development, and cultivating leading enterprises to stimulate the development of industrial clusters.

In essence, the suggested strategies aim to enhance the synergy between digital technologies and traditional manufacturing processes, foster innovation and technological advancement, fortify the workforce with comprehensive skills, and catalyze the growth of industry-leading enterprises for a more cohesive and competitive manufacturing landscape in Jiaozuo City and beyond. These recommendations offer a comprehensive roadmap for manufacturing enterprises seeking to navigate the complexities of digital transformation in the contemporary industrial era.

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