



Working together
www.rcis.ro

Revista de Cercetare si Interventie Sociala

ISSN: 1583-3410 (print), ISSN: 1584-5397 (electronic)

THE BENEFIT OF MANUFACTURING INDUSTRY IN HENAN PROVINCE TO HELP TARGETED POVERTY ALLEVIATION

Guo YU, Jinhuan CHEN, Weijian LI, Weiming CHEN

Revista de cercetare și intervenție socială, 2020, vol. 70, pp. 333-353

<https://doi.org/10.33788/rcis.70.20>

Published by:
Expert Projects Publishing House



On behalf of:
„Alexandru Ioan Cuza” University,
Department of Sociology and Social Work
and
HoltIS Association

REVISTA DE CERCETARE SI INTERVENTIE SOCIALA
is indexed by Clarivate Analytics (Social Sciences Citation Index),
SCOPUS and CROSSREF

The Benefit of Manufacturing Industry in Henan Province to help Targeted Poverty Alleviation

Guo YU¹, Jinhuan CHEN², Weijian LI³, Weiming CHEN⁴

Abstract

Targeted poverty alleviation is the development of rich industrial resources in the central and western regions, bringing considerable economic benefits and achieving poverty alleviation. Henan is an important economic province in China, and its GDP ranks fifth in China, which is the first in the mid-western regions. In the context of targeted poverty alleviation, we will vigorously develop manufacturing and improve the living conditions of residents. This article systematically sorted out the status and constraints of the manufacturing industry in Henan Province, the relevant policies and measures of Henan's financial support for the real economy, and *SWOT* in detail from the aspects of changes in financial aggregates to analyze the relevant results of the manufacturing industry's efficiency improvement. Overall, the total amount of financing in Henan continues to expand, the financing structure continues to improve, financing costs tend to decline, and financial support for the real economy has achieved significant results. In addition, the research has practical significance for improving the economic efficiency of the manufacturing industry.

Keywords: targeted poverty alleviation, manufacturing industry, efficiency improvement, *SWOT*.

¹ School of Economics, Zhengzhou University of Aeronautics Zhengzhou, CHINA. E-mail: gyu@zua.edu.cn

² School of Science, Zhongyuan University of Technology, Zhengzhou, CHINA. E-mail: cjh807@126.com (Corresponding Author)

³ College of Business and Economics, Australian National University, AUSTRALIA. E-mail: weijian.li@anu.edu.au

⁴ Eller College of Management, University of Arizona, USA. E-mail: zhebushiwoyouxiang@gmail.com

Introduction

Manufacturing is a basic and strategic industry for the development of the national economy and the backbone of a country's industrial development. The scale of China's manufacturing industry has grown from small to large, and the quality of development has gradually improved, China's economy has driven to continue to grow miraculously, the development achievements that have attracted worldwide attention (Yang & Yu, 2019). However, comparing the manufacturing industries of developed countries such as the United States, Japan, and Germany, China's manufacturing industry is still in the low-end of the global production system. It is large in scale but the overall innovation capability is not strong enough and intelligent. The level is not too high. In the face of rapid development and continuous innovation, the strategic arrangements of developed countries learnt to use new knowledge and new technologies to improve the level of manufacturing intelligence. We want to achieve sustained high-quality development of the manufacturing industry, and maintain the manufacturing industry to climb to the mid-to-high-end value chain, which improves the production efficiency and core competitiveness of China's manufacturing industry (Liu, Shao, & Chen, 2019). The only strategic path is to take the road of manufacturing intelligence and implement intelligent manufacturing strategy, constantly improve the level of regional manufacturing intelligence, and continue to improve the overall level of China's manufacturing intelligence. As an important industrial and food base in China, *Henan* has vigorously developed the manufacturing industry and played an important role in the economic development of the province. With the development of science and technology, manufacturing has become an important battlefield for competition and promotion of development among countries or regions. In this context, the status of the manufacturing industry analyses of current problems and the promotion of the manufacturing industry are of great significance for promoting comprehensive national strength, ensuring national security, and achieving the two hundred-year struggle goals.

With the continuous advancement of industrialization, the manufacturing industry in the national economy has gradually improved, and it has gradually become a basic and pillar industry. Its level of development marks the economic strength and international competitiveness. Since the reform and opening, China has become the center of international manufacturing industry by its cost advantage. Therefore, we must proceed from a global perspective, pay close attention to the implementation of relevant strategies, build a strong manufacturing country, strengthen the foundation, turn pressure into motivation, and get the admission ticket of a competitive manufacturing power. Against this background, China proposed the manufacturing development strategy of "Made in China 2025" at the end of 2014. The fundamental purpose is to mobilize the people of the whole country to vigorously develop the manufacturing industry and promote the China's manufacturing power (Maha, & Kamel, 2015). There is a close relationship

between the manufacturing service industry and the manufacturing industry, which are born out of the manufacturing industry. It serves as an intermediate input for manufacturing. Finance is inseparable from the real economy. General Secretary Xi Jinping emphasized that the real economy is the foundation of finance; finance is the blood of the real economy, serving the real economy is the bounden duty of finance, the purpose of finance, and the fundamental measure to prevent financial risks. The report of the Nineteenth National Congress of the Communist Party of China clearly stated that it is necessary to enhance the capabilities of the financial services real economy. It is significant to win the three major battles. In order to support the healthy and rapid development of the real economy in Henan Province, the People's Bank of China Zhengzhou Central Sub-branch and other financial management departments have issued a series of policy measures and achieved certain results, but there are still some deficiencies. To this end, this article systematically sorts out the relevant policies and measures to support the economic efficiency of the manufacturing industry in Henan Province under the background of targeted poverty alleviation (Xu, Qi, & Yuanyuancai, 2015). This paper analyzes the relevant results in detail from the aspects of changes in financial aggregates, changes in overall financing structure, changes in credit structure, and changes in financing pricing. Overall, the total amount of financing in Henan continues to expand, the financing structure continues to improve, financing costs tend to decline, and financial support for the real economy has achieved significant results.

In summary, many research results are focused on analyzing the relationship between the producer service industry and the equipment manufacturing industry at the macro level. There is a lack of research from the subdivision perspective of the equipment manufacturing industry, and the research results are relatively broad. In addition, in the measurement of the efficiency of the equipment manufacturing industry, some scholars adopt a single index such as the residual method or the full labor productivity, which will cause a large deviation in the calculation results. This paper presents a study on the economic efficiency improvement of the manufacturing industry in Henan Province under the background of targeted poverty alleviation, and based on different sub-sectors of the equipment manufacturing industry, studies the differential impact of the producer service industry in Henan Province on the equipment manufacturing industry.

Literature review

Related theory

Regarding the research on the development quality of manufacturing industry, the academic circles mostly focus on the research of international trade, enterprise quality management, and industrial development quality. The perspective of

industrial quality research has upgraded to the industrial level, from the micro-enterprise quality measurement of customer satisfaction to the product, to the development theory of industrial scale, structure, and technology. The research on the international competitiveness of the manufacturing industry focuses on the analysis of the impact mechanism. The first is evaluation research, including exploration of indicator systems, methods, and research perspectives. Some scholars use productivity, profit, dynamic and static index construction, and other methods to improve the import and export data method (Wetwitoo & Kato, 2017). Because of the above research, the academic community extends the research perspective to the level of the industrial value chain: the evaluation of manufacturing competitiveness based on value creation, realization, and distribution. The second is the research on the influence mechanism of the international competitiveness of industry. The research on the international competitiveness of the manufacturing industry is relatively rich, and the design of the index system and research method is very mature. Judging from the practice in Japan, in the 1980s, Japanese manufacturing products sold well worldwide, and the US trade deficit with Japan was very large. The US government forced Japan to sign the “Plaza Agreement”, which not only signed unequal trade terms, such as American cars. There are no tariffs to enter the Japanese market, but Japanese cars have to pay high tariffs to enter the US market, and the yen has rapidly appreciated in value. From smart manufacturing perspective of expanding the market, Zheng and Lin (2018) said that intelligent manufacturing is aimed at optimizing product production and trading, using advanced information and manufacturing technology to increase the flexibility of the manufacturing process to cope with the dynamic changing global market manufacturing behavior. In 2016, the Ministry of Industry and Information Technology and the Ministry of Finance issued the “Smart Manufacturing Development Plan (2016-2020)”, which proposed that smart manufacturing is based on the deep integration of a new generation of information and communication technology and advanced manufacturing technology, which runs through design, production, management, service, and other manufacturing activities. Each link of the new type has new production methods with functions of self-awareness, self-learning, self-decision, self-execution, and self-adaptation. Xu & Xiang (2019) put forward from the perspective of the manufacturing value chain that intelligent manufacturing is the penetration of intelligent technology into each link of the manufacturing value chain.

In summary, the connotation of “smart manufacturing” based on the practice of the United States and Japan has continuously enriched through the research and analysis of many scholars, and the description of epitaxial features has become increasingly clear. Existing research mainly focuses on smart technologies, enterprise manufacturing intelligence systems, national advanced manufacturing strategies and policies, and few studies and analyses are conducted from the perspective of manufacturing intelligence. As China’s manufacturing scale has become the world’s largest, manufacturing innovation capability continues to

increase, and the pace of building an innovative country is accelerating, the systematic advancement and objective evaluation of manufacturing intelligence have become major practical and theoretical issues that must have focused on. To objectively evaluate the level of manufacturing intelligence, it is necessary to solve the question of what index to choose from which angle to evaluate. It is necessary to clarify the connotation and extension characteristics of manufacturing intelligence.

Measurement of equipment manufacturing efficiency

1. Model construction and sample selection

For the measurement of the economic efficiency of the equipment manufacturing industry, some scholars use a single indicator, such as the use of total labor productivity measurement, and some scholars use the total factor productivity TFP for measurement (Pu, & Li, 2018). There are generally two methods for the measurement of total factor productivity TFP. (1) “Surplus method” proposed by Solow, it is necessary to first assume the production function form, and different function forms may produce different values, which affects the measurement results. (2) Parameter estimation based on Data Envelope Analysis- Malmquist index evaluation method. The construction basis is the distance function, that is, the distance ratio of each point on the same envelope surface, which does not depend on the specific production function form, which is beneficial to avoid the error of the measurement result. This paper uses the data of the equipment manufacturing industry in Henan Province from 2010 to 2018 to study the efficiency changes of various sub-sectors of the equipment manufacturing industry from multiple levels, and divides the TFP changes of each sub-sector of the equipment manufacturing industry into technical efficiency (*EFFCH*) and technological progress (*TECHCH*) Two parts.

$$TFPCH = M_0(X^t, Y^t; X^{t+1}, Y^{t+1})^{1/2} = \left[\frac{D_0^t(X^{t+1}, Y^{t+1})}{D_0^t(X^t, Y^t)} * \frac{D_0^{t+1}(X^{t+1}, Y^{t+1})}{D_0^{t+1}(X^t, Y^t)} \right]^{1/2} \tag{1}$$

$$= EFFCH * TECHCH$$

$$EFFCH * TECHCH = \left[\frac{D_0^t(X^{t+1}, Y^{t+1})}{D_0^t(X^t, Y^t)} \right] * \left[\frac{D_0^t(X^{t+1}, Y^{t+1})}{D_0^t(X^{t+1}, Y^{t+1})} * \frac{D_0^{t+1}(X^t, Y^t)}{D_0^{t+1}(X^t, Y^t)} \right]^{1/2} \tag{2}$$

$$= PECH * SECHCH * TECHCH$$

In the formula: X is the input index value, Y is the output index value.

If $D_{t_0}(X_t, Y_t)$ represents the distance function (X_t, Y_t) in period t , then $D_{t+1_0}(X_t, Y_t)$ represents the distance function (X_t, Y_t) in period $t+1$. If $D_{t_0}(X_{t+1}, Y_{t+1})$ represents the distance function (X_{t+1}, Y_{t+1}) in period t , then $D_{t+1_0}(X_{t+1}, Y_{t+1})$ represents (X_{t+1}, Y_{t+1}) Distance function in period $t+1$. TFPCH can be further decomposed into technical efficiency change index EFFCH and technological progress change index TECHCH, as shown in formula (1). EFFCH can be further subdivided into pure technical efficiency change index PECH and scale efficiency change index SECH, as expressed in formula (2).

2. Index selection and data description

In the TFP calculation of each sub-industry of the equipment manufacturing industry, the sub-industries included in the equipment manufacturing industry described in this article are defined according to the classification and codes of the Chinese national economic industry (GB/T4754-2002). The equipment manufacturing industry in this article includes metal products (C11), General equipment(C12), special equipment(C13), transportation equipment(C14), electrical machinery and equipment (C15), electronic and communication equipment (C16), and cultural office machinery manufacturing (C17) in *Table 1*. In terms of output, the total industrial output value obtained through the deflation index is used as output. In terms of capital input, due to the generally high fixed capital input and working capital demand of the equipment manufacturing industry, the annual average net asset value is adopted The balance is measured by the sum of the annual average balance of current assets. Among them, the annual average balance of fixed asset net value is based on 2000. The equipment manufacturing industry fixed asset investment price index used to deflate. The annual average balance of current assets is based on 2000, the industrial producer purchase price index used to deflate. In terms of investment, the annual average number of employees is selected as the labor input. The data in this article is mainly from the relevant data of Henan Province in the “China Statistical Yearbook” and “China Industrial Statistical Yearbook” from 2010 to 2017.

Table 1. Annual TFP change rate of each sub-industry

	2010	2011	2012	2013	2014	2015	2016	2017
C11	0.88	0.91	1.13	1.12	1.26	1.2	1.02	0.91
C12	0.96	0.99	1.2	1.34	1.18	1.6	0.87	0.94
C13	0.88	0.92	1.29	1.1	1.2	1.78	1.04	0.94
C14	0.97	1.04	1.13	0.98	0.89	2.04	1.05	0.93
C15	0.92	0.93	1.08	1.22	1.19	1.88	1.09	0.91
C16	0.98	0.99	1.1	1.02	0.92	1.7	1.21	0.87
C17	0.98	1.02	1.3	0.98	1.12	1.93	0.93	0.77

3. Measurement of equipment manufacturing efficiency

This paper uses the input and output data of the equipment manufacturing industry from 2010 to 2017, and uses Deap 2.1 software to analyze the DEA-Malmquist index, and obtains the specific results of the annual TFP change calculation of the equipment manufacturing industry. The specific change trend as shown in *Figure 1*.

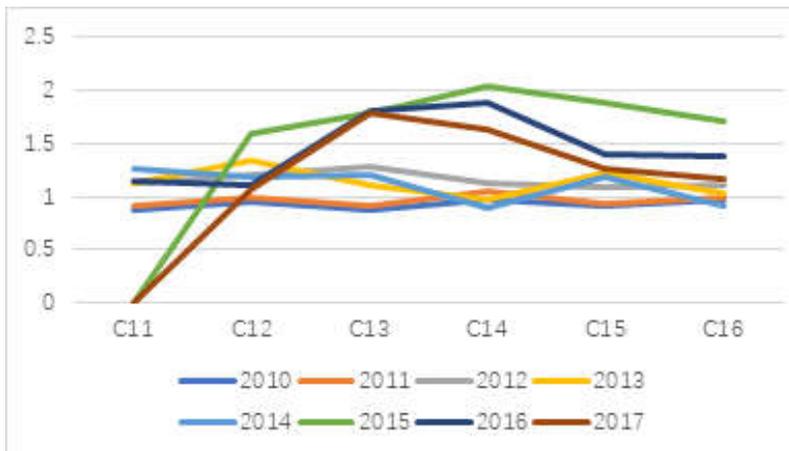


Figure 1. Annual TFP change rate of each sub-industry

Methodology

The research methods adopted in this article are mainly literature analysis, observation method, interview method and questionnaire method. The literature data analysis is to provide a theoretical guide for investigation through the literature and sorting out ideas. Observation method is to observe the researched object to obtain data. To obtain the most intuitive feeling for the development of the manufacturing industry in Henan Province, a field survey and observation were conducted (Sakthivel, Saravanakumar, & Muthuramalingam, 2018). In order to gain a deeper understanding of the real situation, this study adopted an interview method. The interviewees included the manufacturing operators and employees of Henan Province to understand their views on the manufacturing industry of Henan Province, the existing problems in the manufacturing industry of Henan Province, bottlenecks, and the economic efficiency of the tourism industry. This study also used a questionnaire method to select different survey objects, which mainly divided into tour operators, consumers, and residents. 120 questionnaires were distributed. Among them, Zhengzhou sent 40 questionnaires and 35 valid questionnaires were returned. Zhengzhou sent 80 questionnaires and 65 valid

questionnaires. 100 questionnaires were received, with a recovery rate of 83.33%. The attitude scale adopts a five-point scale. The content of the questionnaire survey mainly involves basic demographic information, surveys on the satisfaction of the manufacturing industry in Henan Province, the factors restricting the participation of the poor in the development of the manufacturing industry in Henan Province, the factors restricting the economic efficiency of the manufacturing industry in Henan Province, and the path of improvement.

Results

Status of manufacturing industry development in Henan Province

In recent years, Henan Province has made great achievements in the development of manufacturing services. Because it is difficult to collect specific data on manufacturing in Henan Province, and manufacturing is a major part of industry, relevant data on industrial development can also reflect the level of manufacturing development to a certain extent. Therefore, this article will use the data of industry and producer services to analyze the development status of manufacturing service in Henan Province.

The scale of manufacturing and producer services has expanded simultaneously. From 2010 to 2017, the benefit of industrial enterprises above designated size in Henan increased from 1,394.932 billion yuan to 1,845.206 billion yuan, with an average annual growth rate of 4.77%. The benefit of producer services increased from 258.668 billion yuan to 691.278 billion yuan, with an average annual growth rate of 17.8%. The scale of industrial and producer services has achieved rapid growth at the same time, and the average annual growth rate of producer services is higher than that of industry.

The investment in fixed assets in manufacturing and producer services gradually increased. From 2010 to 2017, the investment in fixed assets of the whole society in Henan Province increased from 91.136 billion yuan to 19,804 billion yuan, with an average annual growth rate of 13.22%. The fixed asset investment in the producer service industry also rose rapidly, from 958.67 billion yuan in 2011 to 1,358.11 billion yuan in 2017, with an average annual growth rate of 24.56% (de Sousa Jabbour, *et al.*, 2018). The fixed asset investment in the industrial and producer services industry in Henan Province is steadily increasing, and the annual growth rate of fixed asset investment in producer services is much higher than the annual growth rate of industrial fixed asset investment.

The number of employees in manufacturing and producer services has increased simultaneously. From 2010 to 2017, the number of employees in industrial and producer services increased simultaneously, and the number of industrial employees increased from 11.956 million in 2010 to 13.563 million in 2017, with an average annual growth rate of 2.11%. The number of employees in the producer services

industry increased from 3.271 million in 2010 to 4.888 million in 2017, with an average annual growth rate of 6.92%. The annual growth rate of employees in producer services is higher than that of industrial employees.

The industrial contribution rate of producer services continues to increase. From 2010 to 2017, the industrial contribution rate of Henan Province decreased from 63.9% to 44.6%, the service industry increased from 32% to 49.6%, and the overall industrial contribution rate of the service industry rose rapidly (Parida & Pradhan, 2016). The industrial contribution rate of producer services is constantly rising. It can be seen that the manufacturing service has become a trend in the development of manufacturing enterprises, which has been highly valued by manufacturing enterprises.

Industry proportion

Evaluation of the overall development level of Henan Province. From the total point of view, the GDP of Henan Province in 2010 was 1,840.778 billion yuan, of which the total value of the secondary industry was 1,047.792 billion-yuan, accounting for 56.9% of Henan’s current GDP, 8.3% higher than the national average. However, in 2010, the absolute number of secondary industry GDP in Henan Province was low, accounting for only 7.1% of the national secondary industry GDP, far below the level of developed provinces such as Guangdong and Jiangsu. Figure 2 shows Henan industrial structure evolution with the proportion of employed population. The gap between the per capita GDP of Henan Province and the developed provinces in China is even wider, being 1/4 of the per capita GDP of Shanghai (Figure 3). Therefore, in order to change the backward situation of the relatively developed provinces in Henan Province, it is necessary to develop the dominant industries of the province, especially the equipment manufacturing industry in Henan Province that this article focuses on, namely “Made in Henan”.

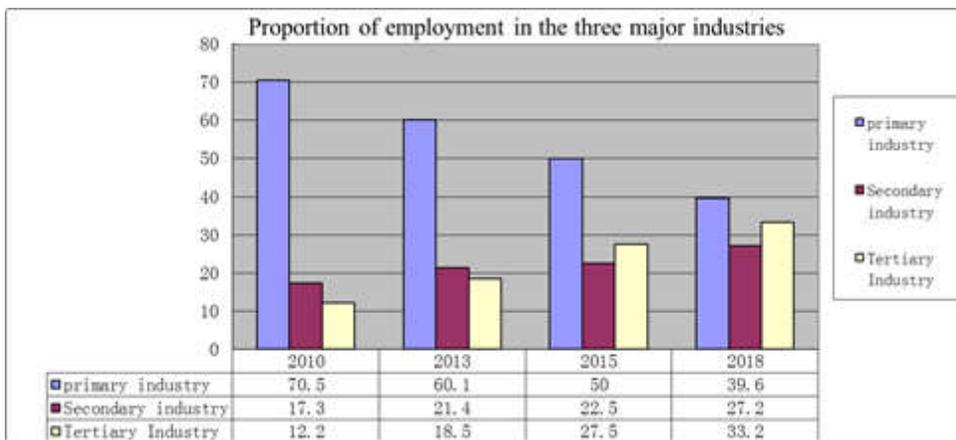


Figure 2. Henan industrial structure evolution: the proportion of employed population

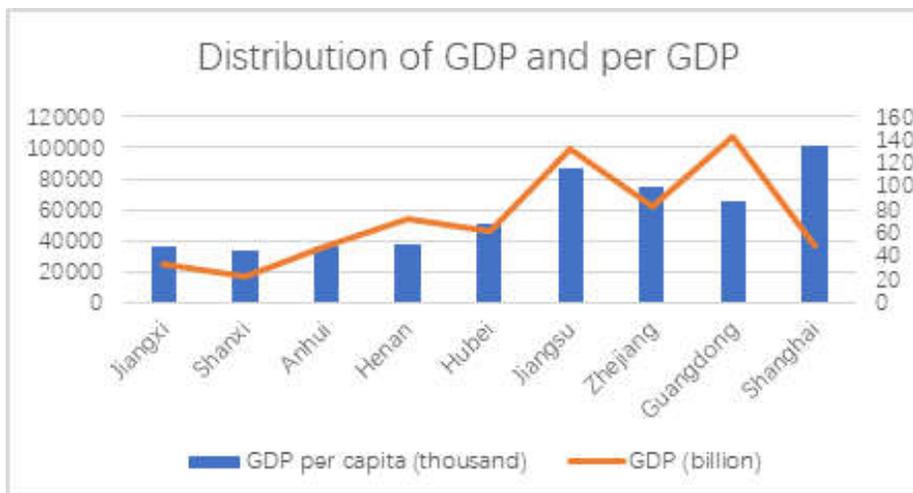


Figure 3. Distribution of GDP and per GDP by province in 2019

During the “Eleventh Five-Year Plan” period, we focused on cultivating and creating six advantageous industries such as food, nonferrous metals, chemicals, automobiles and parts, equipment manufacturing, textiles, and garments. The contribution rate of industrial growth reached 60.4%, the growth of 7.4 % over the previous year. The high-tech manufacturing industry realized a benefit of 26.232 billion yuan, the growth of 23.3%. The six high-energy-consuming industries such as coal, chemicals, building materials, steel, nonferrous metals, and electric power realized a benefit of 324.792 billion yuan, the growth of 13.9%, which was 5.9 % lower than the growth rate of industries above designated size (Yan, & Li, 2015). In terms of growth rate, the secondary industry in Henan Province in 2010 increased by 14.9% over the previous year, which is much higher than the growth rate of primary and tertiary industries, and is 5.6 % higher than the national average growth rate of 9.3%. It is also higher than economically developed provinces such as Guangdong and Zhejiang (Table 3).

Table 3. Comparison of national GDP and growth rate by province in 2018

Area	GDP (billion)			Growth rate (%)		
	primary industry	Secondary industry	Tertiary Industry	primary industry	Secondary industry	Tertiary Industry
Jiangxi	1060.4	3414.9	2005	4.8	16.6	10.1
Shanxi	302.5	4265.8	2370.5	2.5	7.4	10.6
Anhui	1418.1	4137.4	3318.7	6.2	16.4	11

Henan	2658.8	10478	5275	5.5	14.9	10.2
Hubei	1780	4963.6	4586.8	6	16.6	12.4
Jiangsu	2100	16664	11548.8	4	12.9	12.7
Zhejiang	1095	11580	8811.2	3.9	9.4	11.8
Guangdong	1970	1840.3	15323.6	3.7	11.4	9.1
Shanghai	111.8	6236		0.7	8.2	11.37350.4

From the perspective of the contribution rate of the secondary industry to the economy, the contribution rate of the secondary industry in Henan Province reached 57.00% in 2010, which is 4 times the contribution rate of the agricultural industry and nearly 2 times the contribution rate of the tertiary industry (Chaudhuri, 2016). The average contribution rate is 50.60% higher than that of 6.4 %, 5 % higher than that of Guangdong Province, and 3 % higher than that of Zhejiang Province (*Table 4*).

Table 4. Comparison of contribution rate of industrial benefits (%)

Area	primary industry	Secondary industry	Tertiary Industry
Jiangxi	16	53	31
Shanxi	4	62	34
Anhui	16	47	37
Henan	14	57	29
Hubei	16	44	40
Jiangsu	7	55	38
Zhejiang	5	54	41
Guangdong	5	52	43
Shanghai	1	45	54

In terms of employees, the number of employees in the secondary industry has been increasing, from 10.84 million in 2010 to 15.64 million in 2014. The proportion of employment in six years has increased from 19.58% to 26.80%. However, the total labor force absorbed by the secondary industry is far lower than that of agriculture, and it is gradually approaching the level of tertiary industry. This shows that the dominant position of the secondary industry in Henan Province cannot have shaken in the short term, and the industry is showing a trend of rapid and stable development.

Industry evaluation of Henan Province. From the perspective of the internal structure of the secondary industry, the manufacturing industry ranks among the best in terms of sales revenue, total profit, scale, and the number of labors absorbed, far higher than other industries. The mining industry has higher sales revenue, total profits, and taxes, but the amount of labor absorbed is limited, and the industry is constrained by resources. Under the guidance of building an energy-saving society, it is not appropriate to expand the scale. Although the construction industry has a low profit level, it has many units. Being able to absorb a large amount of manufacturing surplus labor force also helps to improve China's infrastructure construction and social living standards. The production and supply of electricity, gas, and water are basic and public welfare industries, and their development should have matched with other industries, mainly manufacturing (*Table 5*).

Table 5. Development comparison of various industries in the secondary industry

Industry	Units	Employed person (Ten thousand)	Assets and liabilities (%)	Main income (Billion)	Total profit (Billion)
Construction industry	3905	198	58.9	11	71
Mining industry	1431	79.9	56.9	3607	471
Manufacturing	20176	303	54.5	19721	1749
Production and living supply such as hydropower	365	21.7	71.7	1965	-39.9

The key area of science and technology input and output in the secondary industry is still manufacturing, and its input accounts for 78.1% of the province's secondary industry science and technology expenditures (Wu, 2015). In addition, from the number of patent applications, the number of scientific and technological activities, and the number of scientific research units, it can be seen that Henan Province attaches importance to the manufacturing industry, forming a scientific development concept that uses high-tech and advanced technology to transform and upgrade traditional industries (*Table 6*).

Table 6. Comparison of technology input and output of various industries in the secondary industry

	Units with scientific and technological activities	Scientific and technical personnel	Science and technology expenditure (Ten thousand)	R&D expenditure (Ten thousand)	New product value (Ten thousand)	Number of patent applications
Sum	1135	211828	1508854	1670440	1445	5220
Mining industry	44	34686	291170	257188	20.9	211
Manufacturing	1077	173391	1178572	1383428	1422	4703
Production and living supply such as hydropower	14	3751	39112	29824	1.9	306

Constraints on manufacturing industry in Henan Province

Not enough knowledge about manufacturing service. In recent years, manufacturing enterprises in Henan Province have gradually attached importance to the development of manufacturing service, and many manufacturing service enterprises have emerged in the field of equipment manufacturing and electronic information. However, these enterprises have a weak awareness of specialized division of labor and cooperation, and the demand for productive services has still dominated by traditional services. The lack of professional modern services is not clear enough and the intensity of the service development of the manufacturing industry is not clear enough. Due to the late start of the manufacturing service in Henan Province, some government departments have not understood the manufacturing service, which regarded the service manufacturing industry and the producer service industry as the same. As a result, many producer service companies have insufficient fiscal and tax incentives.

Insufficient talents and technical support for manufacturing service. In the process of service-oriented development of manufacturing industry, compound talents who are familiar with both manufacturing and service, as well as production and management are needed. From 2011 to 2017, the number of people engaged in scientific research and technical services in the producer service industry in Henan Province increased from 163,000 to 301,300 (“Henan Statistical Yearbook (2010- 2017)”), showing an overall upward trend. However, from the perspective of the number of employees in all sectors of the producer service industry, the proportion of employees in scientific research and technical services is the lowest, accounting for only 6.16% in 2017. While the transportation, warehousing and postal industries have the largest number of employees, which are scientific research and technical services more than 10 times the number of employees. The

shortage of talents and the shortage of high-level talents will restrict the further development of manufacturing service in Henan Province largely.

The scale of producer services is relatively small. From the perspective of the scale of producer services, the benefit of producer services in Henan Province in 2017 was only 691.278 billion yuan, while the producer services in developed provinces such as Beijing, Shanghai, Guangdong, Zhejiang, and Jiangsu in the same period. The added value has exceeded RMB 1 trillion. It can be seen that in the process of manufacturing service development in Henan, the scale of producer service industry in Henan Province is relatively small, and the development level of manufacturing service is relatively low, and it is far lower than that of domestic developed provinces such as Beijing, Shanghai, and Guangdong.

Insufficient external conditions for manufacturing service. At present, one of the main reasons for the relatively low level of service manufacturing in Henan is the lack of external conditions. First, the market system is not perfect, and supervision is not perfect. Compared with the manufacturing industry, the service industry has a higher level of dependence on the legal environment and credit system, which will require higher levels of openness in the fields of finance, commerce, and coordination. However, Henan Province still lags reforms in these areas, the market system is not perfect, the industry supervision system is not perfect, and intellectual property rights are not protected (Krusinskas, *et al.*, 2015). Secondly, from the perspective of the government's support policies, the relevant policy measures obviously have the characteristics of the manufacturing industry, and the support for the technology, taxation, investment, and financing for the service-oriented development of the manufacturing industry is not strong enough.

The business model innovation of manufacturing service is relatively scarce. The development of service-oriented manufacturing requires constant innovation of business models. At present, the service innovation of manufacturing enterprises in Henan Province has dominated by endogenous innovation, which has biased towards technology and product innovation. The tax preferential policies related to technology and tangible product innovation are compared. However, there are relatively few preferential policies for innovation in the service industry, especially the producer service industry, which leads to a lack of innovation in the business model of manufacturing service. This will restrict the further development of manufacturing service in Henan Province to a certain extent.

Upgrading of Henan Manufacturing Industry and Economic Efficiency

Strengths and Weaknesses. Good industrial foundation as a traditional dominant industry in Henan, the manufacturing industry has a good industrial foundation and a sound industrial system. Henan's manufacturing industry includes the seven

major industries of the equipment manufacturing industry. Its advantage is that it has certain industries that are well known both domestically and internationally, such as light passenger cars, CNC machine tools, and other industries. It has formed a certain scale and complete system. Henan's manufacturing industry has certain advantages in transportation equipment, basic equipment, and other industries, and has many domestic leading companies such as Zhengzhou Yutong Bus Co., Ltd. Among all the 7 major industries, 46 middle class and 178 small class products, Henan ranks first in the country. More manufacturing talents are 4,235 enterprises above designated size in Henan's equipment manufacturing industry, with good scientific research capabilities and talent reserves, more than 900 research institutions, 94 colleges and universities, and professional technical talents of state-owned enterprises. It can be seen from the above that Henan already has a hardware foundation for manufacturing transformation and upgrading. Weaknesses in the transformation and upgrading of manufacturing in Henan Province (Weaknesses) Although China is already a major manufacturing country, many manufacturing industries are at the bottom of the international division of labor system and at the end of the value chain. Under such circumstances, the main problems of Henan's manufacturing industry are as follows. The status of high-tech industries is poor, and the level of innovation is low. At present, the overall manufacturing industry in Henan is still at the stage of mechanized production, and the technology is relatively backward. The application rate of high quality and high efficiency technology is low. Compared with the same industry in developed countries, the gap in research, design and manufacturing is relatively large. Lack of excellent management talents and professional technical personnel. Because Henan's manufacturing industry has established early, equipment reform is backward, and the economic benefits are not good, so it is in a weak position in the competition for high-end talents. At present, the professional technical team is weak, lacking top talents and leading figures, which has constrained the technological research and development capabilities and management level of some enterprises. 3. The property rights structure is single, and most of them are state-owned enterprises. The level of development that adapts to the market economy is relatively backward, the concept is old, and the system has fallen behind, resulting in a low level of marketization and relatively rigid enterprise systems and mechanisms.

Opportunities for the transformation and upgrading. At present, the Party Central Committee and the State Council have promulgated and implemented many policies for industrial transformation and smart manufacturing, and have gradually implemented them. Henan Province has also introduced relevant policies and measures to develop manufacturing. The implementation of the "Belt and Road" strategy will help Henan to absorb excess capacity. Henan Province has positioned as an "important window for opening up to Northeast Asia" in the "Belt and Road" strategy. It is an important node connecting Russia, Japan,

and South Korea. (4) Threats of manufacturing transformation and upgrading in Henan Province. At present, the global economic environment is becoming more complex. Affected by the overall impact, the manufacturing industry has also ushered in new challenges. From a global perspective, on the one hand, Western developed countries are accelerating the pace of transformation and upgrading and implementing new strategies such as “Industrial Internet” and “Industry 4.0”. On the other hand, due to abundant resources and lower-priced labor, more and more China’s labor-intensive industries are settled in developing countries such as India and Vietnam. This will make China’s manufacturing industry face both sides of the developed and developing countries in the new round of comprehensive competition.

Industrial economic efficiency improvement path. Analysis of the *SWOT* model for the transformation and upgrading of the manufacturing industry in Henan Province. The *SWOT* analysis matrix lists the four aspects mentioned above, and the *SWOT* analysis matrix for the transformation and upgrading of the manufacturing industry in Henan can be obtained, as shown in *Table 7*.

Table 7. SWOT analysis matrix for transformation and upgrading of manufacturing industry

External opportunity Internal opportunity	O Opportunity Favorable political environment	T threat Uncertainty of the industry’s overall environment
S Strengths Good foundation and many talents	SO strategy (growth strategy)	ST strategy (multiple business strategies)
W Weaknesses Poor high-tech status, brain drain, unitary property rights structure	WO strategy (reversal strategy)	WT strategy (defensive strategy)

The core elements support the rapid development of the manufacturing industry, first, the entities with innovation capabilities, namely enterprises; and second, enterprises must master core technologies. The source of power for sustained and stable development of the manufacturing industry is the core technology acquired through self-innovation and independent intellectual property rights. The third is to build an independent brand. The brand represents high quality and high technology content, and represents the strength and competitiveness of the enterprise. At present, the manufacturing industry in Henan Province already has a strong industrial foundation and good professional talents. On this basis, we must focus on the development of enterprise entities and establish an innovative development method of an enterprise-based “production-academic-

research” system. Strengthen the training of more professionals with master core technology, rely on key universities and colleges across the country such as Zhengzhou University, accelerate the development of key disciplines related to manufacturing, give play to the role of university talent support, and form a talent-driven support system. With the implementation of the “Belt and Road” strategy, we will introduce and develop new technologies, use new information technologies, biotechnology, etc. to upgrade outdated industries and spawn several new manufacturing industries. Through the development of corporate entities and core technologies, more brands that are independent are created.

Discussion

In recent years, Henan Province has guided the banking and insurance industry in Henan to seriously implement the decision-making and deployment of the Party Central Committee and the State Council. Combined with the actual economic and financial development of Henan province, which has successively researched and introduced the Henan banking industry to support advanced manufacturing, the insurance industry’s service to the real economic development, and other 8 regulatory policies. The working mechanism of target management, regular notification, investigation, and supervision improved, and the continuous improvement of financial services urged. As of the end of September, the province’s bank loan balance was 5.59 trillion yuan, the growth of 6723 billion yuan, or 17.11% over the beginning of the year. The growth rate exceeded the national average for 7 consecutive years. The loan balance in the “Belt and Road” sector of the banking industry of the province was 255.1 billion yuan, and the construction loans of the “three districts and a group” was 197.1 billion.

The development of key manufacturing industries

Henan Banking and Insurance Regulatory Bureau guides the banking and insurance industry to implement the policy deployment of the provincial party committee and the provincial government on building Henan as a “manufacturing province”, strongly supports the development of advanced manufacturing, and studies and issues the “Guiding Opinions for Henan Banking Industry to Support the Construction of a Strong Manufacturing Province”. The province introduced the banking industry earlier in the country to support the development of the manufacturing industry, which promoted advanced manufacturing enterprises to the banking industry in conjunction with the Provincial Department of Industry and Information Technology. As of the end of September, the province’s manufacturing loan balance was 597.9 billion yuan. Actively develop green finance. In the first three quarters of 2019, the province’s loans for energy-saving emission reduction projects and services increased by 15.88% compared with the beginning of the

year, and loans to industries with severe overcapacity have reduced by 10.1 billion yuan. Increase support for the people's livelihood, the province added 257.2 billion yuan of personal non-operating loans, and actively meet the escalating consumer demand for residential housing, tourism, education, culture, health, and pension. Focusing on the development of science and technology finance, five city commercial banks set up eight science and technology sub-branches to provide "dual support" of credit and equity financing for high-growth enterprises and technology-based enterprises.

Financial Targeted Poverty Alleviation

In his investigation and investigation in Henan Province in September, General Secretary Xi Jinping emphasized that poverty alleviation requires both wisdom and motivation, blood transfusion and hematopoiesis, establishment of a hematopoietic mechanism, enhanced endogenous power, and prevention of poverty. The Henan Banking and Insurance Regulatory Bureau actively practiced the important instructional spirit of General Secretary Jin Ping on poverty alleviation, and regarded financial poverty alleviation as an important means to win the poverty alleviation battle. One is to innovate and launch a pilot of "bank + insurance" model mall. In early 2019, secretary of the party committee and director of the Henan Banking and Insurance Regulatory Bureau, proposed the pilot "bank + insurance" to support the poverty alleviation and the effective connection of the new model of financial services and manufacturing development. The banking industry focuses on providing "financing" support, and the insurance industry focuses on preventing "returning to poverty and providing a "safety line" for poverty alleviation and manufacturing revitalization projects, so that the two parties can effectively leverage their respective advantages. The second is to increase the resource tilt. The province established 1.78 million poor companies and established "direct-to-household" poverty alleviation of 7.89 billion yuan, directly supporting the development of 322,400 poor manufacturing companies out of poverty. In-depth rectification of the problem of "household loans for corporate loans" for small-scale poverty alleviation loans, the problem rectification rate was 94.4%. A normalized mechanism for financial poverty alleviation supervision was established. In 2018, the province's regulatory system invested 645 person-days, visited 2,635 companies in poverty, and established 17 supervision groups. More than 100 cadres specially conducted on-the-spot supervision on poverty alleviation style and achieved remarkable results.

In the next step, Henan Province will continue to implement the important decision-making arrangements of the Party Central Committee and the State Council, guide the banking and insurance industry to implement the work requirements of the Banking and Insurance Regulatory Commission. The Provincial Committee and the Provincial Government, further strengthen the real economy services, smooth the transmission of monetary policies, and increase credit. The

total amounts optimize the resource allocation structure, focus on increasing the financial support of private small and micro enterprises, and further promote the manufacturing and manufacturing financial services. Guiding and urging banking institutions, especially the major responsible banks, to solidly promote poverty alleviation microfinance, and continue to do a good job of “banking + insurance” to consolidate the effectiveness of poverty alleviation and promote manufacturing revitalization pilots. Further, play the important role of the joint credit mechanism and the debt committee, actively support the development and growth of high-quality enterprises, and focus on helping enterprises in difficulty. At the same time, continue to rectify the chaos in the financial market, and guide bank funds to “get rid of virtual reality”.

Conclusion

China has made decisive progress in combating poverty, and setting poverty alleviation for the world. In general, China’s poverty alleviation and development work has mainly proceeded along two paths. One is the construction of a social security system, emphasizing the maintenance of basic income and minimum living security through social assistance. The second is to increase the income of the poor by developing the economy of the poverty-stricken areas, and to achieve “development-type poverty alleviation”, that is, with the support of the government, relying on the development and processing of the poverty-stricken areas’ own resources to solve the poverty alleviation and development problems. The focus is on economic growth and poverty-stricken areas. The income of the poor has increased. With the development of modern technology and the continuous changes in the market, more and more manufacturing companies no longer focus on the production and sales of products, but extend their tentacles to the entire product life cycle and continue to provide services. The extension of the field has led to the gradual growth in the proportion of services in the entire production and operation process, and there has been a trend towards service in the manufacturing industry. Many manufacturing companies have realized that service is the transformation and upgrading of the manufacturing industry, and gradually integrated into this trend. This paper presents a study on the economic efficiency improvement of the manufacturing industry in Henan Province under the context of targeted poverty alleviation. Using the manufacturing industry in Henan as a model, it will deeply study the factors that affect the economic efficiency of the manufacturing industry. Henan is in a critical period of marching from a big industrial province to a strong industrial province. In 2018, the benefit of industries above designated size in Henan Province increased by 7.2%. The proportion of service-oriented manufacturing enterprises in Henan Province has reached 21%, which has effectively promoted the high-quality development of the manufacturing industry. At present, further advancing the development of manufacturing services

has important practical significance for promoting the high-quality development of the manufacturing industry in Henan Province. Therefore, relevant government departments should actively explore a public service platform that promotes the intelligent transformation of the manufacturing industry, absorbs a large number of excellent innovative resources in the society, and promotes the emergence of China's manufacturing industry economic efficiency. Difficulties provide timely solutions and channels.

Acknowledgements

This work was supported by the A Major Bidding Project of Education Science Planning in Henan Province: Research on "One Belt and one Road" and the Strategy of Henan Education Opening to the Outside World, Program Number: JKGHZDZB07.

References

- Chaudhuri, D.D. (2016). Impact of economic liberalization on technical efficiency of firms: evidence from india's electronics industry. *Theoretical Economics Letters*, 6(3), 549-560. DOI:10.4236/tel.2016.63061
- de Sousa Jabbour, A.B.L., Chiappetta Jabbour, C.J., Foropon, C., & Godinho Filho, M. (2018). When titans meet - can industry 4.0 revolutionise the environmentally- sustainable manufacturing wave? the role of critical success factors. *Technological Forecasting & Social Change*, 132, 18-25 DOI: 10.1016/j.techfore.2018.01.017
- Krusinskas, R., Norvaisiene, R., Lakstutiene, A., & Vaitkevicius, S. (2015). Investment, innovation and firm performance: empirical evidence from small manufacturing industries. *International Journal of Production Economics*, 106(1), 61-69.
- Liu, H, Shao, F., & Chen, L. (2019). Endogenous technological innovation and the upgrading path of manufacturing industry in northeast china-on the change of the share of factor contribution in northeast china. *Journal of Northeast Normal University: Philosophy and Social Sciences Edition*, 4, DOI: 10.16164 / j.cnki.22-1062 / c.2019.04.024
- Maha, K., & Kamel, H. (2015). Technical efficiency determinants of the Tunisian manufacturing industry: stochastic production frontiers estimate on panel data. *Journal of Economic Development*, 40(2), 1-26.DOI: 10.35866/caujed.2015.40.2.005
- Parida, P.C., & Pradhan, K.C. (2016). Productivity and efficiency of labour intensive manufacturing industries in India: an empirical analysis. *International Journal of Development Issues*, 15(2), 130-152. DOI:10.1108/IJDI-12-2015-0081

- Pu, H., & Li, T. (2018). A cross-countries research on the duration of export trade relationships in manufacturing industry. *American Journal of Industrial and Business Management*, 8(4), 850-866. DOI: 10.4236/ajibm.2018.84059
- Sakthivel, G., Saravanakumar, D., & Muthuramalingam, T. (2018). Application of failure mode and effect analysis in manufacturing industry - an integrated approach with fahp-fuzzy topsis and fahp-fuzzy vikor. *International Journal of Productivity & Quality Management*, 24(3), 398. DOI: 10.1504/IJPQM.2018.092984
- Wetwitoo J., & Kato H. (2017). Inter-regional Transportation and Economic Productivity: A Case Study of Regal Agglomeration Economies in Japan. *Annals of Regal Science*, 59, 1-24. DOI: 10.1007/s00168-017-0833-6
- Wu, Y. (2015). Energy efficiency estimation based on Bayesian method and industrial economic transition: taking Shandong as an example. *International Business Research*, 8(10). DOI: 10.5539/ibr.v8n10p35
- Xu, X., Qi, L., & Yuanyuancai, L. (2015). Evaluation research of innovation efficiency of the equipment manufacturing industry based on super efficiency DEA and Malmquist Index. *International Journal of Hybrid Information Technology*, 8. DOI: 10.14257/ijhit.2015.8.4.04
- Xu, X., & Xiang, Z. (2019). Current situation and influencing factors of manufacturing industry agglomeration in the Yangtze river delta: based on SDM model. *Technology and Management*, 4, 26-33. DOI: 10.16315 / j.stm.2019.04.009
- Yan, X., & Li, X (2015). The impact of technological innovation on industrial efficiency and food manufacturing industry. *Advance Journal of Food Science & Technology*, 7(5), 368-373. DOI: 10.19026/ajfst.7.1326
- Yang, G, & Yu, S. (2019). Research on the interactive relationship between information communication technology and manufacturing industry. *Cluster Computing*, 22(2), 1-11. DOI: 10.1007 / s10586-017-1474-3
- Zheng, Q, & Lin, B. (2018). Impact of Industrial Agglomeration on Energy Efficiency in China 's Paper Industry. *Journal of Cleaner Production*, 184, 1072-1080. DOI: 10.1016/j.jclepro.2018.03.016.