



# Research on Digital Economy Enabling High-Quality Development of Manufacturing Industry in Anhui Province

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**Abstract:** As the representative of new economic elements, digital economy is affecting all aspects of the national economy and gradually becoming a new driving force for development. Therefore, it has certain application value to study the high-quality development of digital economy enabling manufacturing industry. Based on the research of other scholars, this paper chooses the panel data of Anhui Province from 2016 to 2020 as the research sample to conduct an empirical study on the impact of digital economy on the high-quality development of manufacturing industry in Anhui Province. The results show that the direct enabling effect of digital economy on the high-quality development of manufacturing industry in Anhui Province is significant, and it can also indirectly enable the high-quality development of manufacturing industry through the intermediary effect of human capital, industrial upgrading and innovation capability; In addition, the enabling effect of digital economy on the high-quality development of manufacturing industry has significant regional heterogeneity. In regions with relatively strong economic development strength, the enabling effect of digital economy is stronger. Therefore, to promote the high-quality development of manufacturing industry in Anhui Province, we should not only pay attention to the direct impact of digital economy on the high-quality development of manufacturing industry, but also pay attention to its indirect enabling mechanism.

**Keywords:** Digital Economy, Anhui Manufacturing Industry, High Quality Development

## 1. Introduction

The digital economy is gradually becoming a new driving force to promote the high-quality development of China's economy. China is in the new era background, and the economic growth model has been transformed into today's high-quality development stage. It can be seen from Figure 1 that the proportion of digital economy in the national economy has increased year by year. The scale of China's digital economy has continued to increase year by year, and its proportion in GDP has risen in a straight line. This shows that the digital economy is a new blue ocean for China's economy to improve efficiency, and it is gradually becoming a new driving force and key force for promoting the high-quality development of China's economy [1]. It is imperative to enter the era of digital economy. In the face of the sudden COVID-19 at the beginning of 2020, the digital economy has played its due role and value. The digital

economy is changing people's production and lifestyle, and gradually becomes one of the guarantees to maintain the stable operation of the economy.

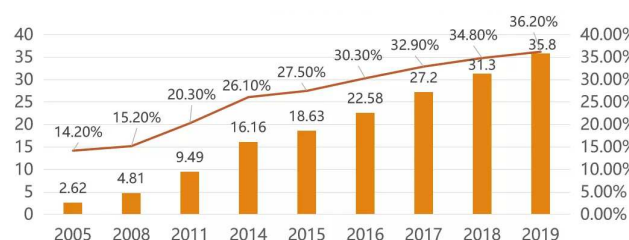


Figure 1. Changes in the Proportion of Digital Economy Scale to GDP.

Anhui Province, as a key city in the development and rise of central China, represents a higher level of digital economy development in China to a certain extent, which has a strong reference significance for other regions with similar resource endowments. In recent years, cities in Anhui Province,

represented by Hefei, have made remarkable progress in the development of digital economy. In 2018, the Department of Economy and Information Technology of Anhui Province implemented the opening project of digital economy and put forward the strategic concept of "digital Jianghuai". At the same time, the Several Policies of Anhui Province to Support the Development of Digital Economy also pointed out that we should fully support the development of digital economy in all fields, enhance the ability of digital technology and industrial innovation, and promote the deep integration of digital economy and real economy to enable high-quality development of manufacturing industry in Anhui Province through digital economy. Therefore, it is of great practical significance to explore the impact mechanism of digital economy on the high-quality development of manufacturing industry.

## 2. Literature Review and Research Hypothesis

### 2.1. Literature Review

#### 2.1.1. Research Status of Digital Economy

Digital economy, as an economic concept, is an economic form in which human beings guide and realize rapid optimal allocation and regeneration of resources and high-quality economic development through the identification, selection, filtering, storage and use of big data (digital knowledge and information). Digital economy, as a relatively broad concept, was first proposed by Tapscott Don, who believed that the innovation of information technology could lead enterprises into the digital economy era. Any economic form that directly or indirectly uses data to guide resources to play a role and promote productivity development can be included in its scope [2].

From the domestic perspective, China Academy of Information and Communications has compiled the Digital Economy Index (DEI) to reflect the development trend of the digital economy, and then measured the scale of China's digital economy from different aspects, including digital industrialization, digital governance, etc; Kang Tiexiang used the calculation methods of foreign scholars to calculate the scale of China's digital economy. Luo Liangqing and Ping Weiying studied the complexity of China's digital economy satellite account compilation from the perspective of integration.

#### 2.1.2. Research Status of High-Quality Development of Manufacturing Industry

For the high-quality development of manufacturing industry, scholars have carried out a more in-depth discussion on its development level and path. Song Xiaona and Zhang Feng, through their research on building an innovative, coordinated, green, open and shared comprehensive measurement system, found that in recent years, the quality of China's industrial development has generally shown an upward trend, showing a spatial distribution pattern of centralization in the middle and decentralization at both ends, and the urban linkage effect is

relatively significant [3]; Che Mingjia and Zhao Yanyun built a high-quality industrial development indicator system based on the concept of improving quality and efficiency and new development, and concluded that China's industry is developing in a high-quality way, but the power of industrial scale, production efficiency and social benefits is weakened [4]; Zhao Aiying and others pointed out that there is a significant gap between the development level of China's manufacturing industry and that of developed countries. In the future, we need to take the path of stimulating demand and strengthening independent innovation to drive high-quality development; The National Development and Reform Commission regards the integration of new industries, new forms, new models and manufacturing industry as an important path for high-quality development of manufacturing industry [5].

#### 2.1.3. Research Status of the Impact of Digital Economy and High-Quality Development of Manufacturing Industry

As two complex systems, digital economy and high-quality development of manufacturing industry interact. Most scholars have found that there is a positive impact between the digital economy and the high-quality development of manufacturing. Influenced by information technology, the innovation ecology of the manufacturing industry is accelerating to take shape. The improvement of the quality of economic development increasingly depends on the breakthrough of key technologies and equipment, the strengthening of talent team support, etc., which requires promoting the digital transformation of the manufacturing industry. Based on provincial panel data, Wei Zhuangyu and others found that the digital economy has significantly promoted the high-quality development of manufacturing industry, and has regional heterogeneity [6]; Based on the background of digital economy, Li Yingjie and Han Ping found that the deep integration of digital economy and high-quality development of manufacturing industry can promote the transformation of manufacturing industry in terms of quality, efficiency and power [7]; Kuang Jinsong and Peng Wenbin found by analyzing the logic that digital economy drives high-quality economic development that industrial digitalization, as an important carrier to promote the highly integrated development of digital economy and real economy, can enable high-quality development of manufacturing industry, and high-quality development of manufacturing industry also provides physical support for the accelerated transformation of digital economy [8].

Through literature review, it is found that there are few researches on digital economy enabling high-quality development of manufacturing industry at home and abroad, and few researches on digital economy and high-quality development of manufacturing industry in Anhui Province. In view of this, this paper first analyzes the direct mechanism of digital economy enabling high-quality development of manufacturing industry in Anhui Province and the transmission mechanism of enabling high-quality development of manufacturing industry through intermediary variables, and

puts forward research hypothesis; Then, an empirical model is built to test the direct impact of digital economy on the high-quality development of manufacturing industry in Anhui Province; And further build the intermediary effect model to test the transmission effect of digital economy through intermediary variables to enable high-quality development of manufacturing industry in Anhui province, so as to provide certain decision-making reference for Anhui province to formulate scientific industrial development policies.

## 2.2. Research Assumptions

With the characteristics of high growth, high technology, high diffusion, high synergy and strong penetration, digital economy has subverted the traditional manufacturing production mode, created a more brutal environment for survival and competition, and forced the manufacturing industry to develop towards high-quality development. From the perspective of direct effect, on the one hand, the rapid development and application of digital technology has accelerated the transformation and upgrading of traditional manufacturing industry to information and intelligence; On the other hand, thanks to the high diffusion and strong penetration of digital technology, through the integration and development of "digital economy + manufacturing industry", a strong technology empowerment effect is formed through technology empowerment, so that the production efficiency of the manufacturing industry is constantly improved, the industrial structure is constantly optimized, and the process of stable development of the manufacturing industry along the high-quality track is accelerated. Based on the above analysis, this paper proposes hypothesis 1.

Hypothesis 1: Digital economy contributes to high-quality development of manufacturing industry.

Human capital empowerment effect. On the one hand, the rapid development of the digital economy has driven the development of technology intensive and knowledge intensive manufacturing industries, changed the level of demand for human capital in related industries, and changed the employment preference of manufacturing enterprises from the original quantitative type to the quality type. On the other hand, with the deep integration of digital technology and manufacturing industry, intelligent production has formed the replacement of highly skilled talents for low skilled workers, which has induced a huge demand for high-end labor in knowledge intensive and technology intensive industries. At the same time, the rapidly developing digital economy has further enriched educational resources, increased educational opportunities and provided more advanced technical means for continuing learning. Therefore, the digital economy not only gives great impetus to the high-quality development of manufacturing industry, but also promotes the demand for knowledge and skills based human capital. Based on the above analysis, this paper proposes hypothesis 2.

Hypothesis 2: Digital economy is enabling high-quality development of manufacturing industry by promoting human capital.

Enabling effect of industrial upgrading. As a new economic form, digital technology enables high-quality development of manufacturing industry by accelerating industrial integration and promoting industrial chain upgrading. From the perspective of industrial integration, digital technology can help form a new driving force to stimulate the vitality of the manufacturing industry, guide the traditional industries to carry out all-round digital transformation, and realize the upgrading of the manufacturing structure. From the perspective of industrial chain upgrading, the development of digital economy can effectively promote the optimization and upgrading of industrial chain; the strong diffusion and permeability of the digital economy enable various new technologies and methods to be widely used [9]. In addition, the development of digital economy has made the efficiency of factor allocation continuously improved and the structure of factor allocation continuously optimized, which has become an important driving force for high-quality development of manufacturing industry. Based on the above analysis, hypothesis 3 is proposed in this paper.

Hypothesis 3: Digital economy is enabling high-quality development of manufacturing industry by promoting industrial upgrading.

The enabling effect of innovation capability. On the one hand, most enterprises in the field of digital economy belong to industries with high knowledge intensity and rich innovation resources. Digital technology progress can extend the innovation boundary of enterprises. On the other hand, due to the strong diffusion effect of digital economy, digital economy can create more value-added space for traditional industries through enabling product innovation, technological innovation, model innovation, etc. In addition, the digital economy provides an open innovation environment, closely linking the industrial end and the innovation end, thereby reducing the cost of enterprise innovation, promoting wider technological innovation, and promoting high-quality development of the manufacturing industry. Based on the above analysis, this paper proposes hypothesis 4.

Hypothesis 4: Digital economy is enabling high-quality development of manufacturing industry through innovation capability.

## 3. Research Design

### 3.1. Study Sample

The rapid development of the digital economy took place after 2015. In order to reduce the impact of data errors on empirical analysis and compare the level of coupling and coordination between the digital economy and high-quality development before and after being considered as an important national strategic deployment, this paper sets the time span of data as 2016-2020. Anhui Province, as a key city in the development and rise of central China, represents a higher level of digital economy development in China to a certain extent, which has strong reference significance for other

regions with similar resource endowments. In this paper, the missing data in the indicators are supplemented by moving average method. The research data are from China Statistical Yearbook, China High tech Industry Statistical Yearbook and the statistical yearbooks of cities in Anhui Province.

### 3.2. Variable Selection

#### 3.2.1. Explained Variable: High-Quality Development of Manufacturing Industry

In recent years, different scholars have constructed different evaluation index systems for high-quality development of manufacturing industry. On the basis of

existing research results, this paper fully considers the comprehensive connotation of high-quality development of manufacturing industry and that Hefei, Anhui Province is one of the two major comprehensive science centers in China. It is an important aspect to investigate its ability to transform scientific research and innovation into practical productivity. Therefore, the innovation potential indicator is added. Finally, the high-quality development level of manufacturing industry in Anhui Province is measured through four dimensions: speed benefit, green development, structure optimization and innovation potential. See Table 1 for the specific evaluation index system.

*Table 1. High quality development evaluation index system of manufacturing industry.*

target	Level I indicators	Secondary indicators	Indicator attribute
Manufacturing High quality development	Speed benefit	Chain on month growth rate of manufacturing output value (%)	+
		Proportion of total profits in main business income (%)	+
	Green development	Sewage discharge per unit output value	+
		Exhaust gas emission per unit output value	+
		Ratio of business income of high-tech manufacturing owners to that of industrial enterprises above designated size (%)	+
	Structural optimization	Ratio of high-tech manufacturing export delivery value to manufacturing export delivery value (%)	+
		Scientific innovation and development level	+
	Innovation potential	R&D investment proportion	+

#### 3.2.2. Core Explanatory Variable: Development Level of Digital Economy

As a new form of business, there is no unified standard for defining the connotation of digital economy at present, which

also leads to its measurement method is not unified. Based on the research of other scholars and the availability of data, the digital economy development evaluation index system constructed in this paper is shown in Table 2.

*Table 2. Anhui Digital Economy Evaluation Index System.*

target	Level I indicators	Secondary indicators	Indicator attribute
Anhui Province Digital economy development	Digital Infrastructure	Internet broadband access ports (10000)	+
		Mobile telephone exchange capacity (10000 households)	+
		Length of long-distance optical cable line (km)	+
	Digital technology application	Internet penetration rate (%)	+
		Proportion of enterprises engaged in e-commerce transactions (%)	+
		Added value of computer communication and electronic equipment manufacturing industry (10000 yuan)	+
		Growth rate of fixed investment in information technology service industry (%)	+
	Digital industry development	The proportion of urban unit employment in information technology service industry in urban employment (%)	+
		Growth rate of fixed investment in information technology service industry (%)	+

#### 3.2.3. Intermediate Variables

- (1) Human capital, human capital is the sum of the value of knowledge and skills embodied in workers and acquired through investment. It is the key to improve a country or region's innovation ability and core competitiveness and promote its high-quality development. Education is the main way to improve human capital. Therefore, this paper measures the level of human capital by the years of education per capita.
- (2) Industrial upgrading. It has become an indisputable fact that the growth rate of the service industry is slightly higher than the industrial growth rate in the context of the digital economy. Using the research of scholars for reference, this paper uses the ratio of the output value

of the tertiary industry to the output value of the secondary industry to express industrial upgrading.

- (3) Innovation ability, the number of patents granted is to a large extent the embodiment of enterprises' technological innovation ability. The more patents granted, the stronger their technological innovation ability. Therefore, this paper uses the number of patents granted to represent innovation ability.

#### 3.2.4. Control Variables

- (1) Investment incentives (INVS). The manufacturing industry is the main body of the market supply side, and its development is obviously affected by market investment. When the investment increases, the development of the manufacturing industry accelerates

and can achieve good returns. Therefore, this paper uses the ratio of fixed investment in information technology services to GDP to measure the market's investment incentives for manufacturing.

- (2) Government Regulation (GOVR). Government regulation has a significant impact on the development of manufacturing industry. The number of government input resource elements or the degree of regulation can significantly affect the development of manufacturing industry. Referring to the practice of other domestic researchers, the government regulation is measured by the proportion of government fiscal expenditure in GDP [10].
- (3) Scientific Research Overflow (SRO). The level of regional scientific research has a significant positive effect on the development of manufacturing industry. When the level of regional scientific research is improved, the performance formed by the spillover of knowledge, technology and other production factors will promote the development of manufacturing industry. Drawing on the practice of Yu Shan and others, the annual patent authorization amount of each city in Anhui Province is used as an indicator to measure scientific research spillover. In order to ensure the stability of data analysis, the number of patents authorized is logarithmic [11].

The data of each city in this paper are from the statistical yearbook of each prefecture level city in Anhui Province, and the annual patent application data of each city are from the Intellectual Property Development Center of Anhui Province. The missing values of individual indicators are filled by interpolation.

### 3.3. Research Model

#### 3.3.1. Datum Model

$$Higua_{it} = \alpha_0 + \alpha_1 Digit_{it} + \sum_{j=1}^3 (\beta_j \bullet X_{j \bullet it}) + \mu_{it} \quad (1)$$

Where  $i$  is individual utility and  $t$  is time effect;  $\alpha_1$  is the regression coefficient of the core explanatory variable, namely the digital economy;  $X$  is the control variable, and  $\beta_j$  ( $j = 1, 2, 3$ ) is the regression coefficient of three control variables, namely investment incentive, government regulation and research spillover;  $\alpha_0$  is a constant term and  $\mu$  is a random perturbation term.

#### 3.3.2. Mediation Effect Model

Using the research of Wen Zhonglin and Ye Baojuan for reference, on the basis of the benchmark model (1), the intermediary effect model is set, as shown in model (2) and model (3).

$$M_{it} = \theta_0 + \theta_1 Digit_{it} + \sum_{j=1}^5 (\lambda_j \bullet X_{j \bullet it}) + \varepsilon_{it} \quad (2)$$

$$Higua_{it} = \kappa_0 + \kappa_1 Digit_{it} + \kappa_2 M_{it} + \sum_{n=3}^5 (k_n \bullet X_{n \bullet it}) + \varepsilon_{it} \quad (3)$$

Where,  $M$  represents the intermediary variable, including human capital, industrial upgrading and innovation capability, and  $X_n$  ( $n=3, \dots, 5$ ) is the control variable.  $k_1$  and  $k_2$  are regression coefficients of digital economy and intermediary variables respectively, and the meanings of other variables are the same as those of model (1).

According to the intermediary effect test method proposed by Wen Zhonglin and Ye Baojuan [12], if the Digit regression coefficient in the benchmark model (1) is positive significant, then test model (2) and model (3) in turn; Otherwise, there is no intermediary effect. If  $\theta_1$  in model (2) is significantly positive, it indicates that the digital economy has a significant impact on intermediary variables; then test model (3). If  $k_1$  and  $k_2$  in model (3) are both positive significant, it indicates that mediating variables play a part of mediating effect; If  $k_1$  is not significant,  $k_2$  is positive significant, indicating that the intermediary variable plays a complete intermediary role. Wherein,  $k_1$  represents direct effect and  $\theta_1 \times \kappa_2$  represents intermediary effect.

## 4. Empirical Test Results and Analysis

### 4.1. Benchmark Regression

First of all, the benchmark model (1) is selected by test. According to the test results and considering the endogenous problems that may be caused by difficult to observe individual differences, this paper finally chooses to use the individual fixed effect regression model. At the same time, in order to avoid potential heteroscedasticity and sequence correlation problems, the method of "OLS+clustering robust standard error" is used for specific estimation. In order to weaken the impact of data fluctuation on the regression results, and natural logarithm (Ln) treatment is applied to all variables. The regression results are shown in Table 3.

Table 3. Benchmark Regression Results.

variable	Model 1	Model 2	Model 3	Model 4
InDigit	0.6251***	0.4358***	0.6137***	0.5136***
InInvs		0.1147***	0.6927**	0.2835**
InGovr		0.0767**	0.4636*	0.2048*
InSro		0.1673	0.5824	0.3144
Constant	-0.8967***	-6.9347***	-6.7528***	-7.1293***
term	(-10.4228)	(-15.3671)	(-9.4582)	(-7.352)
$\overline{R^2}$	0.7439	0.8627	0.8446	0.7242

Note: \*\*\*, \*\*, \* are significance levels of 1%, 5% and 10% respectively; the statistical value of  $t$  in parentheses

- (1) Model 1 is the regression result without adding control variables, and model 2 is the regression result after adding control variables. It can be seen from the results in Table 3 that the regression coefficient of digital economy is still positive significant with or without control variables, and the coefficient test is significant. It means that the rapid development of the digital economy has played a positive role in the transformation of the production mode of the

manufacturing industry, significantly promoting the improvement of the high-quality development level of the manufacturing industry. The digital economy has become a new driving force to boost the high-quality development of the manufacturing industry. This paper assumes that 1 is true.

- (2) Among the control variables, the regression coefficient of investment incentive, government regulation and scientific research spillover is significantly positive, among which investment incentive can significantly promote the high-quality development of manufacturing industry by improving economic efficiency and promoting innovation potential; At the initial stage of government regulation, it had a weak negative impact on all aspects of manufacturing development, and its positive significance gradually emerged over time; Scientific research spillover can significantly improve the economic benefits of manufacturing industry to promote its high-quality development, but it has no significant effect on green development and innovation potential, which may be due to the insufficient transformation capacity of scientific research achievements in China's market.
- (3) Model 3 and Model 4 in Table 3 are the test results of samples. The sub sample test can not only illustrate the robustness of the overall regression results, but also

examine whether there is regional heterogeneity in the impact of the digital economy on the high-quality development of the manufacturing industry. The regression results show that the digital economy has a significant positive impact on the high-quality development of the manufacturing industry in Anhui Province, but the comparative analysis shows that the regression coefficient of the digital economy in the relatively developed regions is significantly greater than that in the less developed regions, It means that the higher the level of economic development, the stronger the effect of digital economy driving the high-quality development of manufacturing industry. Hefei, Wuhu, Bengbu, Chuzhou and other cities have changed significantly over time in terms of digital infrastructure, digital technology application, and digital industry development power, and are clearly ahead of the pack.

#### 4.2. Intermediary Effect Test

As the regression coefficient of digital economy in the benchmark model (1) is significantly positive, it meets the conditions for the intermediary effect test. The individual fixed effect estimation method is used for the intermediary effect model (2) and model (3), and the results are shown in Table 4.

Table 4. Mediation Effect Test Results.

variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
InDigit	0.5824*** (6.2185)	0.3913* (1.9825)	0.6341*** (4.3619)	0.3764** (2.7556)	0.3275** (2.1174)	0.4834*** (6.3417)
InHuman				0.3452*** (3.4186)		
InIndus					0.3286** (2.6528)	
InTech						0.4385*** (6.9732)
Add control variable or not	Yes	Yes	Yes	Yes	Yes	Yes
Constant term	-16.8359*** (-8.7425)	-12.9324*** (-6.4528)	-11.0735*** (-10.7529)	-19.7535*** (-13.7416)	-9.0548*** (-7.1527)	-11.2478*** (-15.6482)
$\overline{R^2}$	8.1783	8.7529	9.0472	8.7639	7.9427	8.4318

Note: \*\*\*, \*\*, \* are significance levels of 1%, 5% and 10% respectively; the statistical value of t in parentheses

In Table 4, Model 1, Model 2 and Model 3 are the regression results of the digital economy on the intermediary variables, namely, human capital, industrial upgrading and innovation capacity. The regression coefficients are significantly positive, indicating that the digital economy has a significant positive impact on the intermediary variables. Model 4, Model 5 and Model 6 are the results of intermediary effect regression respectively.

The intermediary effect of human capital is 0.2010 ( $0.5824 \times 0.3452$ ), indicating that it plays a significant positive intermediary effect in the high-quality development of digital economy enabled manufacturing industry. It shows that under the background of digital economy, the demand for human capital in the manufacturing industry has gradually shifted from labor-intensive to technology intensive talents, and the advanced structure of human capital plays an increasingly

important role in upgrading the value chain of the manufacturing industry and promoting the high-quality development of the manufacturing industry. Hypothesis 2 of this paper is established.

The intermediary effect of industrial upgrading is 0.1286 ( $0.3913 \times 0.3286$ ), which means that the digital economy can optimize and upgrade the industrial structure, and the feedback mechanism formed by the industrial upgrading helps to enable the high-quality development of the manufacturing industry, realizing the collaborative progress of the digital economy, industrial upgrading and high-quality development of the manufacturing industry. Therefore, digital economy can effectively enable high-quality development of manufacturing industry by promoting industrial upgrading. This paper assumes that 3 is true.

The intermediary effect of innovation capability is 0.2781

(0.6341 × 0.4385), which shows that stimulating the innovation vitality of manufacturing enterprises and enabling them to improve their innovation level through the digital economy has a very significant positive role, and implies that the enabling effect of the digital economy needs strong support from R&D and innovation activities, which verifies the establishment of Hypothesis 4 in this paper.

The above test results show that the intermediary effect of innovation capability is the strongest, followed by human capital and industrial upgrading. The development of digital economy will accelerate the improvement of human capital, industrial upgrading and innovation ability, and human capital, industrial upgrading and innovation ability will feed

back to the high-quality development of manufacturing industry; Due to the positive intermediary effect, the digital economy significantly enables the high-quality development of manufacturing industry in Anhui Province.

#### 4.3. Robustness Test

The robustness test of this paper uses the moderating effect model, that is, on the basis of the benchmark model, the cross terms of digital economy and human capital, industrial upgrading, and innovation ability are introduced into the model as explanatory variables, while other variables remain unchanged. The results are shown in Table 5.

Table 5. Robustness Test.

variable	Model 1	Model 2	Model 3	Model 4
LnDigit	0.4523*** (2.9078)	0.2911** (2.0056)	0.3246*** (4.9025)	0.4327*** (7.9418)
Ln(Digit×Human)		0.4235*** (8.0536)	0.3314*** (5.1135)	0.5011*** (6.5648)
Ln(Digit×Indus)			0.2764** (2.3305)	0.3014** (2.0657)
Ln(Digit×Tech)				0.5721*** (9.0362)
Add control variable or not	Yes	Yes	Yes	Yes
Constant term	-9.0538*** (-11.9846)	-16.0974*** (-11.9034)	-7.9843*** (-9.0346)	-11.9835*** (-15.9537)
$\overline{R^2}$	7.4729	8.1694	8.6564	9.2445

Note: \*\*\*, \*\*, \* are significance levels of 1%, 5% and 10% respectively; The statistical value of t in parentheses

Model 1 is the regression result without adding cross terms. Table 5 shows that the regression coefficient of digital economy is positive and significant. Model 2, Model 3 and Model 4 are the regression results of adding the cross items of digital economy and human capital, digital economy and industrial upgrading, and digital economy and innovation capability respectively. It can also be seen from Table 5 that the regression coefficients of each cross item are also positive significant, indicating that the positive effect of digital economy on driving the high-quality development of manufacturing industry through the interaction with intermediary variables is significant. Among them, the interaction of innovation capability has the strongest effect on driving the high-quality development of manufacturing industry, with a regression coefficient of 0.5721; they are human capital and industrial upgrading. Therefore, the digital economy can directly enable the high-quality development of manufacturing industry in Anhui Province, and can also enable the high-quality development of manufacturing industry in Anhui Province through intermediary variables, which proves the robustness of this research conclusion.

## 5. Research Conclusions and Suggestions

### 5.1. Research Conclusion

Based on the relevant theoretical analysis of the impact of digital economy on the high-quality development of manufacturing industry, this paper takes the panel data of Anhui Province from 2016 to 2020 as the research sample to

measure the impact of the development level of digital economy on the high-quality development of manufacturing industry in Anhui Province, and from the perspective of human capital, innovation ability, and industrial upgrading, it empirically tests the impact mechanism of digital economy on the high-quality development of manufacturing industry by building an intermediary effect model. The main conclusions are as follows: (1) the development of digital economy has a significant positive effect on the high-quality development of manufacturing industry in Anhui Province; (2) human capital and innovation ability are important channels for digital economy to drive high-quality development of manufacturing industry in Anhui Province. And the positive reinforcement effect of innovation ability is greater; (3) although the digital economy has a significant positive impact on industrial upgrading, the strengthening effect of industrial upgrading on the high-quality development of manufacturing industry driven by the digital economy is not significant.

### 5.2. Suggestions

It can be seen from the research conclusions of this paper that human capital, innovation ability and industrial upgrading have different reinforcement effects on the digital economy driving the high-quality development of manufacturing industry in Anhui Province. Therefore, the following suggestions are put forward:

- (1) Grasp the favorable opportunity of digital empowerment for high-quality development of manufacturing industry

in Anhui Province, and give full play to the positive effect of digital economy driving high-quality development of manufacturing industry in Anhui Province. In the process of accelerating the construction of the digital economy, considering the heterogeneity of the driving effect of the digital economy on the high-quality development of the manufacturing industry under different economic backgrounds, it is suggested that in regions with relatively developed economies, the layout of new manufacturing industry chains supported by Internet, artificial intelligence, cloud computing and other technologies should be accelerated to enrich the application scenarios of digital technology in the manufacturing industry, And then strengthen the leading role of digital economy in driving high-quality development of manufacturing industry [13]. In relatively underdeveloped areas, attention should be paid to improving digital infrastructure, consolidating the foundation of digital technology, promoting the cultivation of digital industries, and improving the digital level of manufacturing, so as to accelerate the release of the dividend of digital economic development.

- (2) Improve the level of human capital and provide talent support for high-quality development of manufacturing driven by the digital economy. The development of manufacturing enterprises in the new situation needs to be combined with digital transformation, and should also take full account of their own development and adjust the development mode of manufacturing enterprises in Anhui Province. In the process of development of manufacturing enterprises, different technical disciplines and industries can be integrated, and talent cultivation can be carried out in combination with their own development mode, so as to reserve sufficient human capital and promote their own development.
- (3) Increase investment in independent technological innovation and cultivate new momentum for high-quality development of manufacturing driven by the digital economy. At the same time, it is suggested that local governments can encourage enterprises to carry out independent innovation activities, carry out their own production technology innovation and improve their own independent technology research and development capabilities through financial support, tax relief, supporting public infrastructure and other policies, so as to burst new vitality and promote the development of the manufacturing industry.

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