Research on the Influence Mechanism of New Quality Productivity on the High-Quality Development of Manufacturing Enterprises

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Abstract: In recent years, the technological and industrial revolution is accelerating the development of society, and China's economy has turned to the stage of high-quality development. Under this background, high-tech, high efficiency and high-quality development has become the focus of China's attention. As an important carrier of the development of the real economy, the high-quality development of manufacturing enterprises has become the key. In this paper, the a-share listed manufacturing enterprises in 2011-2022 are selected to empirically analyze the influence mechanism of new quality productivity on the high-quality development of Chinese manufacturing enterprises.

***Keywords*:** new quality productivity, high-quality development, manufacturing enterprises

1. Foreword

In recent years, the scientific and industrial revolution is accelerating social development, and China's economy has shifted to a stage of high-quality development. Under this background, high-tech, efficient and high-quality development has become the focus of China's attention. The report of the 20th National Congress of the Communist Party of China points out that high-quality development is the primary task for China to build a modern socialist country in an all-round way, and emphasizes the core position of the real economy in it [1]. As an important carrier of the development of the real economy, the high-quality development of manufacturing enterprises has become the key. As a pillar industry of China's national economy, the manufacturing industry has achieved rapid development after the reform and opening up. However, although such a high-speed train runs fast and far, it is difficult to enter the track of high-quality development. Enterprises still continue the traditional economic development mode of "focusing on speed and neglecting quality". High quality development path, must realize economic and social development and ecological environment protection go hand in hand, speed up the traditional productivity development mode towards green development, promote green low carbon, resource conservation, environmental protection of the mode of production and way of life, rely on the means of production and innovation and the quality of workers, transformation development power, realize the green transformation of the mode of economic development[2].Productivity is the most active factor to promote social progress, and it is also the most likely potential force and the new realistic force. Therefore, the new quality productivity came into being. New quality productive force is a more advanced productivity form formed by the improvement of production factors and the optimal combination of production factors developed to a certain level. Giving full play to the role of good natural conditions in promoting social productive forces is the inevitable requirement of new quality productive forces, and also the inevitable choice to achieve high-quality economic development[3].Therefore, it is of great significance to study the influence of new quality productivity on the high-quality development of manufacturing enterprises. In this paper, the a-share listed manufacturing enterprises in 2011-2022 are selected to empirically analyze the influence mechanism of new quality productivity on the high-quality development of Chinese manufacturing enterprises.

2. Literature review and research hypotheses

As China's economy enters the stage of high-quality development, the concept of new quality productivity arises spontaneously. New quality productivity is a new form of productivity emerging under the promotion of information technology and digital revolution. The application of information technology is the key driving force to promote production. People through the digital, automation and intelligent means to realize the efficient, accurate and flexible production process. Theoretical level, Jiang Yong [6] to build new quality productivity theory to promote the development of high quality system framework and path design, points out that from the revolutionary breakthrough, optimize innovative allocation of production factors, promote transformation and upgrading of industrial elements, speed up the development of green transformation, reform the new production relations and so on five aspects, promote new quality productivity lead high quality development towards a new stage. New productive forces represent the future development direction of China's manufacturing industry. Promoting the deep integration of the digital economy and the real economy is one of the key points and paths to accelerate

the formation of new productive forces. Xie Baojian [4] based on the pearl river delta region, digital economy can improve enterprise innovation ability, promote consumption upgrade and improve the level of financial development way directly or indirectly promote transformation and upgrading of manufacturing, and the foreign investment, the level of economic development and make the driving effect more significant. Song Jia [7] is based on the two-factor theory of two factors of productivity, namely labor force and production tools, and divides the labor force into live labor and materialized labor (labor object); the production tools are refined into two sub-factors of hard technology and soft technology, and the entropy method is adopted to construct a new quality productivity index system. Li Chunyu [5] using the measurement index system of state-owned enterprises high quality development is analyzed, found in recent years control of state-owned enterprises and influence, competitiveness and the ability to resist risks of continuous optimization, innovation significantly increased, but there are also capital "big but not strong", "fatigue", "innovation" weak ", layout" leading weak " problem.

Based on the above analysis, this paper focuses on the impact of new quality productivity on the high quality development of manufacturing enterprises, and further analyzes the heterogeneity impact of new quality productivity on the high quality development of manufacturing enterprises under different ownership properties. Based on this, this paper proposes the following assumptions:

Hypothesis 1: New quality productivity will effectively promote the high-quality development of manufacturing enterprises.

Hypothesis 2a: New quality productivity is more obvious in promoting the high-quality development of state-owned manufacturing enterprises.

Hypothesis 2b: The new quality productivity plays a more obvious role in promoting the high-quality development of private manufacturing enterprises.

3. Research design

3.1 Data source

In this paper, the a-share listed manufacturing enterprises in 2011-2022 are selected as the panel data, and the data and information of relevant enterprises are from Guotai'an and Wande databases. In order to ensure the availability and accuracy of the data, this paper first eliminates the financial, ST, ST * and abnormal data enterprises in the sample, and uses winsor to reduce the tail of 1% of the variables to deal with the influence of extreme values. For a small number of missing data values, the mean method is adopted to fill in.

3.2 Variable setting

3.2.1 Explained variables

High-quality development of manufacturing enterprises (Hqd), this paper adopts the method of Ding Hongyi and the entropy value method, and constructs the high-quality development index of enterprises from three dimensions of economic profit, social value and environmental benefit. The specific situation is shown below.

Table 1. Comprehensive index system for high-quality development of manufacturing enterprises

High-quality development	Dimension type	Indicator type	Specific calculation method
Manufacturing concern High-quality development	Economic profit	Net profit growth rate of (+)	Enterprise current net profit than the previous net profit growth rate
		Inventory to income ratio (+)	Inventory / operating income
		Net fixed assets of (+)	Original value of fixed assets-the cumulative depreciation amount-the amount of impairment provision
		Total factor productivity is (+)	The TFF was measured using a fixed-effect method (FE)
		cost in business (-)	Main business cost + other business cost
		selling expenses (-)	The sum of all the accumulated sales expenses
		general expenses (-)	Expenses incurred by the administrative department of the enterprise to manage and organize business activities
	Social effectresults benefit	earnings per share (+)	Earnings per share = (net profit for the current period-preferred stock dividend) / annual weighted average total share capital
		Compensation paid to employees (+)	Total compensation paid to the employees
		number of employees (+)	The number of employees in the enterprise is a log number
	Environmental value	Environmental tax (+)	Main business income log / environmental tax natural log
		Whether the IS09001 certified (+)	If the enterprise passes ISO9001 certification, the value is 1, otherwise it is 0

3.2.2 Core explanatory variables

New quality productivity (NP), the core of new quality productivity is innovation. This paper refers to the method of Song Jia and other scholars, constructs the new quality productivity index system from the three aspects of laborers, labor objects and labor materials, and uses the entropy method to measure the new quality productivity. The specific situation is shown in the table below.

Table 2. Comprehensive index system of new quality productivity

Factor	Metric	Index value
Labourer	Salary ratio of r & D personnel	R & D expenses-payroll / compensation / operating income
	RESEARCH and development staff	Number of R & D personnel / number of employees
	The proportion of people with high education background	Number of undergraduate degree or above / number of employees
Subject of labour	The proportion of fixed assets	Fixed assets / Total assets
	The proportion of manufacturing expenses	(Subtotal of cash outflow from operating activities + depreciation of fixed assets + amortization of intangible assets + impairment provision-cash for purchase of goods-wages paid to employees and employees) / (Subtotal of cash outflow from operating activities + depreciation of fixed assets + amortization of intangible assets + impairment provision)
Means of labor	The portion of R & D depreciation and amortization	R & D expenses-depreciation and amortization / operating income
	The proportion of r & d rental fee	R & D expenses-Rental / revenue
	Proportion of direct R & D investment	R & D expenses-Direct input / operating revenue

3.2.3 Control variables

In order to improve the accuracy of the regression results, this paper includes institutional investor shareholding (INST), return on equity (ROE), large shareholders capital occupied (Occupy), operating income growth rate (Growth), enterprise asset-liability ratio (Lev) as control variables, and cited the enterprise ownership nature (SOE) as a virtual variable, to explore the ogeneity of new manufacturing productivity with different ownership properties.

Table 3. Variable definition table

Variable name	Variable symbol	Variable-definition
High-quality development of manufacturing enterprises	Hqd	Estimation of entropy value method
New quality productivity	NP	Estimation of entropy value method
Share ratio of institutional investors	INST	The total number of shares held by institutional investors is divided by the circulating share capital
Returns on equity	ROE	The ratio of the net profit to the total assets at the end of the year
Capital occupation of major shareholders	Occupy	Other receivables divided by the total assets
Increase rate of business revenue	Growth	The ratio of the operating income of the current year to the operating income of the previous year is minus 1
Asset-liability ratio	Lev	The ratio of total liabilities to total assets
Nature of enterprise ownership	SOE	Belong to state-owned enterprises to take 1, otherwise take 0

3.3 Model setting

In order to verify whether the new quality productivity has an impact on the high-quality development of manufacturing enterprises, the following fixed-effect regression model is established for verification:

$$Hqd_{it} = \beta_0 + \beta_1 NP_{it} + \beta_2 Control_{it} + \beta_3 Year_{it} + \beta_4 IND_t + \varepsilon_{it}$$

Among them, the explained variable is the enterprise high quality development (Hqd_{it}), the explanatory variable is the new quality productivity (NP_{it}), and $Control_{it}$ related to the high quality development of the enterprise, the individual fixed effect is expressed by “IND”; the year fixed effect is represented by “Year”, which is a random disturbance term ε_{it} .

4. Analysis of the empirical results

4.1 Descriptive statistical analysis

As can be seen from Table 4, the reduced data excluded the influence of the extreme values, Mean and Std of Hqd values. The close approach shows that the internal difference of the development index of listed manufacturers is small. The maximum value of Np value varies greatly, indicating that there is still a large gap in the development level of new quality productivity of listed manufacturing enterprises. The statistical results of the other control variables also match the setting of this paper. The low degree of dispersion of the data shows that the development degree of each listed manufacturing enterprise is similar.

Table 4. Descriptive statistical analysis

Variable	Obs	Mean	Std.dev	Min	Max
Np	18,463	5.048448	2.209425	0.0905	28.3833
Hqd	18,477	38.52091	46.82523	5.2043	181.933
INST	18,477	0.4184297	0.2486048	0.001293	0.91039
ROE	18,477	0.0665974	0.1446182	-4.690294	2.378936
Lev	18,477	0.3950888	0.1858391	0.0568962	0.8292321
Occupy	18,464	0.0118405	0.0233383	0	0.7264686
Growth	18,473	0.1536099	0.3147469	-0.4545151	1.723723
Soe	18,467	0.2825581	0.4502555	0	1

4.2 Correlation analysis

In order to verify the concept of Chinese new quality productivity of substantial impact on manufacturing enterprises, from the economic profit, social value and environmental benefit of high quality development index, high quality development index and Np, INST, ROE, Lev, Occupy, Growth regression, because the core explanatory variables and explained variables are constructed by entropy method, so the R-squared coefficient is low.

The regression results are shown in Table 5 (1), and the regression model showed good statistical properties. The whole regression equation is linearly significant at the 1% significance level, and it can be concluded that the impact of new quality productivity on the high-quality development of manufacturing enterprises is relatively significant. The core explanatory variables-new quality productivity (Np) at 1% of significance, it can be concluded that the concept of new quality productivity of manufacturing enterprise quality development play a certain role, shows that with the promotion of new quality productivity, the enterprise in product quality, technical content, market competitiveness will be enhanced, and promote the development of high quality. In addition, among the selected control variables, the capital occupation of major shareholders (O ccupy), the growth rate of operating income (G rowth), and the nature of enterprise ownership (Soe) also affect the high-quality development of enterprises, among which the capital occupation of major shareholders and the growth rate of operating income will have a negative impact on the high-quality development of manufacturing enterprises. Capital appropriation of major shareholders usually refers to the occupation of the company's resources, capital or assets through various ways, which may lead to the decline of the company's operating efficiency. The results show that Occupy has a significant negative impact on the high-quality development of enterprises, which indicates that the capital occupation behavior of major shareholders may erode the resources and capital of enterprises, reduce the investment in research and development, innovation and market expansion, and thus damage the long-term development ability of enterprises. This behavior may lead to the deterioration of the financial situation and the imbalance of the governance structure, which will hinder the enterprise from achieving high-quality development goals. However, Growth has a significant negative impact on the high-quality development of enterprises, which may be that enterprises pursue too much short-term revenue growth, and may ignore quality improvement and long-term strategic investment, such as product research and development, technology improvement and brand building. This situation may lead companies to sacrifice quality during high-growth stages, ultimately affecting their sustainability and long-term competitiveness. Therefore, this article assumes that the 1 holds.

Because of the enterprise ownership nature (Soe) significant influence on enterprise high quality development, state-owned enterprises and private enterprises, the new quality productivity put forward the influence of the development of high quality is different, so this paper selected state-owned enterprises and private enterprises, to return, to explore the influence of the development of high quality. The results of state-owned manufacturing enterprises are shown in (2), and the results of private manufacturing enterprises are shown in (3). The results found that the new quality productivity of the

state-owned and private manufacturing enterprises have significant quality development, the coefficient of state-owned enterprises Np is 1.074, the private enterprise Np coefficient is 0.598, significance level is significant at 5% level, shows that new quality productivity quality development of state-owned enterprises have significant and stronger than private enterprises. State-owned enterprises can make more effective use of technological innovation and management efficiency improvement to promote their high-quality development. As state-owned enterprises, their sensitivity to policies and natural resource advantages make them more able to grasp the opportunities generated by new quality productivity compared with private enterprises. At the same time, it also reflects that private enterprises face more challenges in technological innovation and resource integration. Although the new quality productivity is still important, its driving force for the high-quality development of enterprises is less significant than that of state-owned enterprises.

Table 5. Regression results

VARIABLES	(1)	□2□	□3□
	Hqd	Hqd	Hqd
Np	0.692***	1.074**	0.598**
	(0.241)	(0.467)	(0.287)
Inst	-1.718	-3.431	-0.860
	(2.592)	(5.804)	(2.984)
Lev	3.570	8.387	1.956
	(2.621)	(5.564)	(3.116)
ROE	2.404	-0.400	4.138*
	(2.026)	(3.582)	(2.507)
Occupy	-36.29***	-60.86**	-29.91**
	(12.20)	(26.76)	(13.81)
Growth	-1.522*	-0.417	-1.635*
	(0.850)	(1.706)	(0.984)
Soe	5.376***		
	(1.874)		
Observations	18,437	5,199	13,238
Number of code	2,147	583	1,709
R-squared	0.013	0.013	0.013

Standard errors in parentheses ,*** p<0.01, ** p<0.05, * p<0.1.

4.3 Robustness test

In the robustness test, we replaced the explanatory variable from the new quality productivity (Np) to the log of enterprise green patent applications (Gpatent) to verify the robustness of the results. As an important indicator of innovation activities, the number of green patent applications can reflect the ability of enterprises in technological innovation and intellectual property accumulation in China's social environment. By using this index, we can further evaluate the impact of enterprise innovation investment on their high-quality development, and test whether the action mechanism of different innovation activities on enterprise high-quality development is consistent. The results of the robustness test showed that the regression model after replacement remained consistent with the main conclusions of the original model, further enhancing the reliability and universality of the conclusions.

5. Study conclusions and recommendations

In this paper, the data of all a-share listed manufacturing enterprises in 2011-2022 are selected for empirical analysis, and it is found that the new quality productivity can effectively promote the high-quality development of enterprises. Through the above analysis, the paper proposes the following development suggestions:

First, we will increase investment in scientific research and accelerate the development of new-quality productive forces. New quality productivity can effectively from the economic profits, social value and environmental benefits three dimensions positive impact on enterprise development, so the government should vigorously foster new quality productivity, enterprises should also fully attention to the development of new quality productivity strategic value and market significance, strengthen the development of the development of new quality productivity, realize sustainable high quality development.

Second, strengthen corporate governance to prevent major shareholders from occupying funds. Strengthen the

supervision of corporate governance structure, especially the supervision of capital occupied by major shareholders. Policies can improve the corporate governance laws and regulations, clarify the behavior boundary of major shareholders, prevent major shareholders from abusing resources and damaging the long-term development of enterprises. At the same time, we should promote the transparency of the information disclosure system, enhance the effectiveness of enterprise internal supervision and external audit, and ensure that enterprise resources can be used to improve new quality productivity and achieve high-quality development.

Third, we will strengthen policy guidance to guide the long-term development of private enterprises. Policy support should be increased to help them overcome bottlenecks in resource and financing, and enhance their capabilities in technological innovation and management optimization. As private enterprises face more challenges in technological innovation and resource integration, policies can help private enterprises improve new quality productivity by setting up special funds, providing tax incentives and financing support. At the same time, private enterprises are encouraged to pay attention to long-term strategic investment, avoid excessive pursuit of short-term growth, and promote their transformation to high-quality development.

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