

The Effects of Servitization on Manufacturing Firm Performance: Moderating Role of Marketing Capability

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Abstract

Based on the current development of China's manufacturing industry, this study analyses the relationship between servitization and firm performance, and explores the moderating role of marketing ability. The study collected and processed the annual reports of manufacturing firms that disclosed information on CNINF in 2017. Through a series of screening work, the annual reports of 260 firms were finally selected as sample data. The results of empirical analysis show that there is a positive relationship between servitization and firm performance. Marketing ability can moderate this relationship, in which marketing investment intensity positively moderates the relationship between service level and firm performance, and the proportion of salespeople negatively moderates the relationship between service investment intensity and firm performance. Based on these findings, this paper developed recommendations for managers of manufacturing firms.

Keywords: *Servitization; Firm Performance; Marketing Capability*

1 INTRODUCTION

In recent years, with the rapid development of economy, the competition among firms is becoming more and more fierce. In the fierce competition, many firms have been eliminated. In order to survive and further develop, many firms have to start looking for new ways to win customers and consumers. For manufacturing firms, it is becoming more and more difficult to attract or even impress consumers simply by relying on products, that is, the traditional product sales model has been difficult to support the development needs of manufacturing firms. Therefore, the service-oriented manufacturing industry has gradually become a major trend for the development of manufacturing industry, which makes firms gradually transition the value chain from product-centered to service-centered.

However, many well-known manufacturing firms have fallen one after another in the process of service-oriented. This phenomenon has attracted the attention of many scholars, and then put forward the relevant conclusion of "service trap" [1]. This view reveals that service-oriented cannot make a positive contribution to firm performance under any conditions, and there are complex ways and influencing factors in the process of influencing firm performance [2]. So far, the impact of servitization on performance is still a hot topic among many scholars. The disputes on this issue can not be generalized. The existence of "service trap" shows that there are complex influencing factors on the impact of servitization on firm performance. Through what ways does servitization ultimately affect firm performance? What factors affect this process? These problems have not been fully explained so far. Therefore, this study hopes to further explore the impact of servitization on firm performance, take marketing ability as a moderating variable, and study its moderating role in the process of servitization affecting performance.

2 LITERATURE REVIEW

2.1 Servitization

As early as the end of 20th century, foreign countries began to study the phenomenon of servitization. The concept

of servitization was first put forward by Vandermerwe (1988) [3]. Manufacturing enterprises no longer only provide goods, but take customers as the center and provide more complete product service packages; At the same time, the service gradually occupies a leading position in the whole package and has become the main source of value-added. " For the understanding of service-oriented, some scholars define it as a collection of "products + services" [4], while others regard service-oriented as an enterprise strategy or business model [5-7]. Most subsequent studies agree with and borrow vandermerwe's concept of service [8-11], and believe that the essence of service-oriented manufacturing enterprises is to meet the personalized needs of consumers. From the definition of the concept of service in the existing literature, it can be seen that the relevant research is mainly reflected in the role transformation of manufacturing enterprises from manufacturing products to providing services [9].

2.2 Servitization and Firm Performance

Although the servitization have a positive impact on manufacturing firms, which has been supported by many scholars, many large manufacturing firms that once had a brilliant time have also died prematurely because of the service-oriented strategy. Coupled with some theoretical research at home and abroad, it is not difficult to find many problems in the implementation of servitization. Neely et al. (2008) [12] found in their research that the actual profit level of manufacturing firms undergoing service-oriented strategic transformation seems to be far lower than that of pure manufacturing companies, so the impact of servitization on firm performance is not a simple linear relationship, and this phenomenon was later defined as "service-oriented trap" by Gebauer (2005) [1]. Neely (2008) and Wincent (2013) believe that the relationship curve between service and performance is U-shaped [13-14]. Kastalli (2013) [15] and Li (2015) [16] found that the impact of service-oriented on performance presents a distinct "saddle shape".

Xiao [17] found that the relationship between service and performance is also different in different industries of the manufacturing industry, "the curve is inverted U-shaped in the food and beverage processing and textile industries, but saddle shaped in the vehicle manufacturing and electronic information manufacturing industries". This phenomenon further shows that there are some important influencing factors in the process of service-oriented affecting firm performance, and many scholars have also conducted many studies on this issue.

Many scholars have introduced servitization as an intermediary variable into relevant research, hoping to study the relationship between them through this aspect, including the research of Zhu (2015) [8][18]. Eggert (2011) [19] classifies the situational factors affecting the relationship between service-oriented and firm performance into two categories, namely environmental factor characteristic factors and firm characteristic factors. In order to further study the relationship between the two, some scholars introduced moderating variables into the research. The introduced moderating variables mainly include extension resources and product innovation [14][19][20]. Specifically, Fang (2008) [21] studied the U-shaped regulation of idle resources on service and corporate value. Antioco (2008) [22] studied the moderating effect of several organizational elements (including cross departmental communication, high-level service commitment, service training, service technology and service incentive) on the relationship between different service-oriented strategies and product sales and service sales. Kohtam (2013) [23] and others studied the moderating effect of organizational network capability on them.

Although there are many moderating variables when considering the effect of servitization on firm performance, the literature and research on this aspect are still very limited.

3 HYPOTHESIS

3.1 The Effects of Servitization on Firm Performance

In the research of service-oriented manufacturing firms, the research on the relationship between servitization and firm performance is still the "pet" of academia. The interaction between them is affected by too many complex factors, which leads to many diverse conclusions and results. However, there is no doubt that no matter what results are obtained, researchers are generally unified: the relationship curve between the two will be affected by many factors such as market environment, industrial sector and local service industry tradition [24]. Considering this reality, this study introduces marketing ability as a moderating variable in the process of exploring the relationship

between servitization and performance, and explores the relationship between them on this basis. The servitization process of manufacturing firms can be divided into two main processes: service input and service output [8]. When manufacturing firms propose and implement corresponding service-oriented strategies, service items related to products will be added to their products, such as comprehensive product services (use guide, service, maintenance, management, etc.), overall solutions, etc. On the one hand, this measure meets the diversified and personalized needs of consumers and is conducive to improving customer loyalty; On the other hand, the added service items also increase the user value of products. Theoretically, this measure will have a positive impact on firm performance. Based on the above views and conclusions, the first hypothesis of this study is put forward:

H1: Servitization will have a positive impact on firm performance.

3.2 The Moderating Role of Marketing Capability

A major direction of the role of marketing ability is to improve the sales volume of products or services. For manufacturing firms, the sales volume of firms is closely related to performance. Based on the research of existing scholars, with the support of resource-based theory, when the marketing ability improves its own ability by integrating various resources, its goal is to better meet the needs of consumers [25]. The marketing activities of firms are highly dependent on the products produced and services provided by firms. The fundamental purpose of marketing activities is to transfer their products or services to consumers. Therefore, there is a relationship between marketing ability and services that can not be ignored [26].

It is reasonable to choose marketing capability as the regulating variable between servitization and performance. According to the relevant explanation of Philip Kotler, marketing is essentially a functional process of a firm. As one of the functional activities of a firm, it has an inseparable relationship with performance. Marketing function is an important function connecting firm strategy and customers. Market-oriented marketing strategy is conducive for firms to focus on their target market, which can meet the needs of consumers to the greatest extent, and then improve the business income of firms to a certain extent. In addition, marketing capability itself also has the basis as a moderating variable [27]. Through the function of capability, firms can more effectively integrate and allocate the tangible and intangible resources of firms, maximize their benefits and relatively improve the competitiveness of firms [28]. As an important strategic measure of manufacturing firms, service-oriented information still needs to be transmitted to consumers through marketing activities, which has to take into account the role of marketing ability.

In a broad sense, marketing capability can be understood as the ability of firms to convert marketing expenditure into marketing revenue [29]. Marketing expenditure is mainly focused on advertising and publicity expenses, indicating the investment of firms in sales and promotion [30]. This part of expenses is conducive to changing and improving the identification of products, thus affecting consumers' consumption decisions. Under the current complex consumption background, service factors are added to products to make products stand out among many competitive and alternative products, guide consumers' consumption, and increase firm income. On the other hand, there is also an extremely important relationship between marketing ability and the implementation of servitization. Firstly, the marketing ability reflects the ability of the firm to generate and integrate relevant market information, which is the result of the long-term accumulation of marketing practice activities, including market research ability, customer management ability, channel management ability, customer knowledge ability and customer acquisition ability [31]. Firstly, when firms implement the service-oriented strategy, it is necessary to conduct market research to determine the relevant views and responses of their target customer groups to service-oriented strategy. Only the customer-oriented and service-oriented strategy can attract customers to the greatest extent and establish strong ties with them, and the services recognized and accepted by customers can really bring value to them, so as to increase their loyalty to the firm [32]. On the other hand, marketing ability is conducive to truly reflect the relevant service needs of customers and plays a supporting role in providing high-quality services to customers [33].

Other studies clearly show that marketing ability will have a positive impact on market performance, and to a certain extent, it proves that firms with outstanding marketing ability or difficult to be imitated and copied will obtain relatively good performance [34-35]. Specifically, in the research of scholars [30], it is found that marketing investment activities such as sales expenses have a positive correlation with firm performance. Combined with the

existing literature, when defining the marketing ability, one of the purposes of the marketing ability mentioned in this paper is to meet the needs of consumers. In order to achieve this goal, it is difficult to make profits only by product production, so many manufacturing industries have started the process of service-oriented transformation [36]. Marketing ability can help effectively formulate corresponding strategies according to consumer needs, which is conducive to achieving the expected financial objectives [37]. At present, the research on the relationship between servitization and performance is still inconclusive due to the influence of complex factors. Since marketing capability has an impact on servitization and performance respectively, is there a moderating role between servitization and performance. The original research assumes that marketing capability will moderate the relationship between servitization and performance. From the perspective of the above research, marketing capability has a very important impact on the servitization and performance. On this basis, the following research hypotheses are put forward:

H2: Marketing capability plays a positive moderating role in the relationship between servitization and performance.

4 RESEARCH DESIGN

4.1 Data Collection

This paper selects manufacturing firms that disclose the 2017 annual report (hereinafter referred to as the annual report) on CNINFO as the research object, in which all data are obtained through manual search and calculation. In order to minimize the experimental error and improve the credibility of the research results, the following screening and processing of the original data were done before the formal research: (1) all manufacturing firms that did not carry out service business (or had carried out but did not disclose in their annual reports) were excluded, and a total of 340 annual reports were obtained after elimination; (2) Excluding the firms with transaction status of ST and st *, these firms are often companies with abnormal financial or other conditions, and there are certain problems in operation, which may affect the experimental results; (3) Firms with incomplete important data such as service input, service income, sales expenses, proportion of sales personnel, main business income and cost in the annual report are excluded; (4) Eliminate the contradictory samples of the disclosed information; (5) Firms with extreme or abnormal values in the sample are excluded. All sample data were screened according to the above requirements. A total of 260 firms met all conditions. The number of effective data directly obtained from the annual report was 2860, the number of effective data processed and calculated by themselves was 1560, and the total number of effective data was 4420. We hope to complete the statistical analysis of data with the help of data processing software Stata15.0.

4.2 Defining Variables

1) *Dependent variable*

In this paper, the main business income can be used to measure the performance, $per = \ln(\text{net main business income})$.

2) *Independent variable*

This paper will measure the servitization through two indicators: service intensity and service level. Accordingly, the study uses the abbreviation ser1 of the word service: $ser1 = \ln(\text{service input})$. The service income is used as the index to measure the service of firm, expressed by ser2: $ser2 = \ln(\text{service income})$.

3) *Moderating variable*

The resource-based theory regards the firm as a collection of capabilities and resources. The firm integrates the resources through its various capabilities to achieve the expected results. As one of the important abilities of firms, marketing ability has always been a factor that can not be ignored. Generally, it is considered that the firm can measure the level of proficiency that the activity may achieve by the proportion of resources invested in the activity. Similarly, this paper uses the ratio of marketing investment to the firm operating cost as the measurement index of marketing ability. Marketing investment mainly refers to the sum of firm sales expenses and marketing activities such as advertising and promotion. However, in China, manufacturing firms do not subdivide these indicators in detail, and most enterprises do not explain them separately in their public annual reports. It is generally believed that

the sales expenses disclosed in the annual report of manufacturing firms include advertising and promotion expenses. Therefore, in this paper, the enterprise sales cost is used as one of the measurement indicators of marketing ability, which is expressed by the acronym MC of marketing capacity: $MC = \ln(\text{sales cost})$. On the one hand, the marketing ability is closely related to its investment in marketing activities, on the other hand, it is also closely related to the sales personnel of the firm. Because firms cannot carry out marketing activities or service-related activities without the support of sales personnel, in order to explore the impact of marketing ability, the proportion of sales personnel is used as another index to measure the strength of marketing ability, which is shown by the acronym MP of marketing personnel: $MP = (\text{number of sales personnel} / \text{total number of employees}) * 100\%$. In the process of analysis, MC and MP are used as the measurement indicators of marketing ability.

4) Control variable

In order to control and eliminate other factors that will affect firm performance and then affect the experimental results, this paper introduces firm size and age as control variables. The value of firm size is taken as the measurement index of the firm size, which is expressed by size: $\text{size} = \ln(\text{total assets of the firm})$, and the time since the establishment of the firm (in years) is selected as the firm age.

5 RESULTS ANALYSIS

5.1 Descriptive and Correlation Analysis

Before the regression test, a descriptive statistical test was conducted on the data involved in all variables with the help of the data processing tool Stata15.0. The statistical results are shown in Table 1 below.

TABLE 1 DESCRIPTIVE STATISTICAL ANALYSIS

Variables	Obs	Mean	Std. Dev.	Min	Max
Per	260	21.379	1.509	16.673	29.599
Ser1	260	17.385	3.46	0	24.506
Ser2	260	18.45	2.109	12.378	24.79
MC	260	18.512	1.598	12.305	24.065
MP	260	.125	.121	.005	.644
Size	260	21.358	8.758	5	68
Age	260	22.216	1.246	18.067	26.269

The contents of the table mainly include the sample number, mean, standard deviation, minimum and maximum values of each variable. The average value of net main business is 21.379, and the standard deviation is 1.509, which indicates that most of the 260 relevant data are still close to the average value. Similarly, although there is a big gap between the extreme value of service input intensity and service level of each firm, its average value and variance are also similar to the net income of main business, indicating that the data are relatively close to their average value, but the difference of service input is relatively large. In addition, from the two measurement indicator, although the average level is relatively concentrated, the difference between the maximum and minimum reflects the great gap of servitization. From the perspective of marketing investment intensity, the investment of manufacturing firms in sales expenses is very similar to the relevant data of service level; The average proportion of sales personnel is 12.5%, indicating that the proportion of sales personnel in the total employees of the firm is relatively consistent with the marketing investment intensity. In addition, the age and scale of firms are relatively concentrated.

A simple correlation analysis is carried out, as shown in Table 2 below.

TABLE 2 CORRELATION ANALYSIS

Variables	Per	Ser1	Ser2	MC	MP	Size	Age
Per	1.000						
Ser1	0.0087	1.000					
Ser2	0.1003	0.0168	1.000				

MC	0.7622***	-0.0441	0.0833	1.000			
MP	0.3898***	0.0070	0.0494	0.5879***	1.000		
Size	-0.2899***	0.0305	0.0359	-0.0866	-0.0960	1.000	
Age	-0.1253**	-0.0360	0.0545	-0.0021	0.0754	0.2056***	1.00

Note: ** p <0.05,*** p <0.001

It can be found that there is a positive correlation between service-oriented investment intensity and performance, which is consistent with the hypothesis H1 proposed above, but the specific relationship between the two needs to be determined through subsequent regression test; Similarly, there is also an obvious positive correlation between the service level and performance in the table below. The specific still needs to be tested by the subsequent regression model. There is a significant positive correlation between marketing investment intensity and sales staff ratio and performance. In addition, the firm size and age show a negative correlation with performance.

5.2 Regression Analysis

In this study, the data processing software Stata15.0 was used to test and analyze the dependent variables, independent variables, moderating variable and control variables. Through this method, we hope to explore the relationship between servitization and performance, as well as the moderating role of marketing ability, and test the two hypotheses proposed above.

1) Main effect analysis

According to the experimental hypothesis H1, this study first conducted the following three regression tests. Model 1 first added control variables to detect the relationship between control variables and performance. Then two independent variables (Ser1 and Ser2) are introduced into the corresponding model. The results are shown in Table 3.

TABLE 3 MAIN EFFECT ANALYSIS

Variables	Model 1		Model 2		Model 3	
	Coef.	p-value	Coef.	p-value	Coef.	p-value
Ser1			0.033**	0.039		
Ser2					0.102***	0.000
Size	1.017***	0.000	0.982***	0.000	0.931***	0.000
Age	0.002	0.673	0.003	0.585	0.005	0.410
Constant	-1.274	0.160	-1.070	0.238	-1.291	0.144
R-squared	0.711		0.716		0.727	
F-test	316.683		215.248		227.079	

Note: ** p <0.05,*** p <0.001

It can be seen from model 1 in Table 3 that the relationship between firm size and performance is significant at the level of 0.01, and has a positive impact on performance, that is, the larger the firm size, the more conducive to the improvement of firm performance. This may be because when the firm size becomes larger and larger, the strength and resource advantages of the servitization are more competitive than those of smaller firms in terms of capital and equipment. The relationship between age and performance is not significant at the level of 0.1, which shows that although the regression coefficient between age and performance is greater than 0, the corresponding p-value = 0.673 is not significant, that is, age has no significant impact on performance. The reason for this phenomenon may be that the age is relatively scattered and the age gap between firms is large, so a relatively stable age-performance relationship cannot be formed.

In addition, model 2 and model 3 respectively study the relationship between service input intensity, service level and performance, in order to explore whether there is a significant correlation between servitization and firm performance. From model 2 and model 3 in Table 3, the two explanatory variables selected in this study have passed the significance test, in which the service input intensity is significant at the 5% level and the service level is significant at the 1% level. According to model 2, there is a positive correlation between service investment intensity and performance ($\beta = 0.033$ and $p\text{-value} = 0.039$); Similarly, model 3 shows that there is a positive correlation

between service level and performance ($\beta= 0.102$, and $p\text{-value} = 0.000$), and according to $R\text{-squared} = 0.727$, the fitting of the relationship between the two is ideal.

2) Moderating effect analysis

Through the regression test of the main effect relationship, the regression test and analysis of the moderating effect of marketing ability on the main effect relationship in this study are carried out. According to the relevant models (models 4, 5, 6 and 7), the two measurement indicators of marketing ability (MC and MP) are set as moderating variables and introduced into the model for test. The specific results are shown in Table 4.

Model 4 and model 5 in Table 4 respectively explore the moderating effect of marketing capability on the relationship between service input intensity and performance. Model 4 explores the moderating effect of marketing investment intensity on the relationship between service investment intensity and performance. The results show that neither marketing investment intensity nor the cross term between marketing investment intensity and service investment intensity can pass the significance test. Model 5 studies the moderating effect of the proportion of salespeople on the relationship between service investment intensity and performance. The main variables have passed the significance test, and the cross term between the proportion of salespeople and service investment intensity has passed the significance test at the 5% level ($\beta=- 0.202$, and $p\text{-value} = 0.018$). However, in this model, when the proportion of salespeople and service input intensity are used as independent variables, they both pass the significance test at the 1% level, and the corresponding coefficients are positive ($\beta_1=0.07, \beta_2=3.914$).

Model 6 and Model 7 explore the moderating effect of marketing ability on the relationship between service level and performance. Model 6 shows the regression test results of the moderating effect of marketing investment intensity on the relationship between service level and performance. The results show that the cross term of marketing investment intensity and service investment has passed the test at the 10% significance level, and the coefficient is positive ($\beta= 0.017$, and $p\text{-value} = 0.085$), but similarly, the marketing investment intensity itself did not pass the significance level test. However, observing Model 7, it is found that in this type, only the main variable of service level has passed the significance test, and the cross term between sales staff proportion and service level has not passed the significance test.

TABLE 4 MAIN EFFECT ANALYSIS

Variables	Model 4		Model 5		Model 6		Model 7	
	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value
Ser1	-0.151	0.224	0.070***	0.001				
Ser2					-0.237	0.193	0.135***	0.000
MC	0.193	0.100			0.045	0.800		
Ser1×MC	0.010	0.147						
Ser2×MC					0.017*	0.085		
MP			3.914***	0.007			5.231	0.118
Ser1×MP			-0.202**	0.018				
Ser2×MP							-0.260	0.157
Size	0.672***	0.000	0.977***	0.000	0.648***	0.000	0.935***	0.000
Age	0.002	0.642	0.001	0.839	0.004	0.449	0.003	0.626
Constant	2.328	0.320	-1.614*	0.079	4.786	0.169	-1.993**	0.039
R-squared	0.795		0.725		0.800		0.731	
F-test	197.054		133.872		203.558		137.862	

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.001$

6 RESULTS DISCUSSION AND CONCLUSION

6.1 Results Discussion

Different from the test of the main effect relationship, both independent variables passed the significance level test.

Among the four models shown in Table 4, only the moderating variable in two models passed the significance level test. In model 4 and Model 7, the marketing investment intensity and the proportion of salespeople did not pass the significance level test. This means that marketing investment intensity can not play a moderating role in the relationship between service investment intensity and firm performance. Similarly, the proportion of salespeople can not adjust the relationship between service level and firm performance.

However, it is worth noting that the moderating variable in model 5 and Model 6 passed the significance level test. Model 5 verifies the moderating effect of marketing investment intensity on service level and performance, and the corresponding coefficient is positive. In other words, the moderating effect of marketing investment intensity on the main effect relationship is the same direction, and marketing investment intensity can positively moderate the relationship between service level and performance, which is consistent with the experimental hypothesis of this study. This may be because when the service level of firms becomes stronger and stronger, firms have achieved relatively good results in the process of implementing service-oriented measures. At this time, the marketing ability also meets the requirements of service-oriented to a certain extent and can match the service level of firms. At this time, by increasing the intensity of marketing investment, consumers can better perceive the services provided by firms, which is conducive to the growth of firm performance. In model 6, although the moderating variable also passed the significance level test, the corresponding coefficient is negative, which is contrary to the experimental hypothesis H2 in this paper. The model reflects that when the proportion of salespeople is used as the moderating variable, the moderation of the relationship between service investment intensity and firm performance is reverse. Therefore, for firms, if they try to positively adjust the relationship between service investment intensity and performance by increasing the proportion of salespeople, the result will be counterproductive. The reason may be that when firms increase service investment in order to better meet the needs of consumers, due to the limitations of various aspects of the firm, such as resources, funds and capacity, if the proportion of sales personnel is increased at the same time, it may cause great cost pressure to the firm, so that the firm can not balance its expenditure and income in a short time, Let alone improve performance. Therefore, the proportion of salespeople has a negative regulatory effect on this main effect relationship. In addition, this may also be because although the proportion of salespeople has increased, the poor effect and efficiency of training and popularization of technology and knowledge may reduce the service quality, resulting in the possibility of reducing consumer loyalty.

Overall, the regulation of marketing ability is more complex than expected, and the experimental results are related to the selection of marketing ability measurement indicators. Finally, it can only show that marketing ability can moderate the main effect relationship of this study, but the specific regulation mechanism can not be simply summarized as positive or negative.

6.2 Conclusion

On the basis of consulting and summarizing the existing relevant literature, this paper studies the relationship between servitization and firm performance, and mainly solves two research questions: (1) is there a correlation between servitization and firm performance? If so, is it linear or nonlinear? (2) Does marketing ability moderate the relationship between servitization and firm performance? If yes, how to adjust it? By obtaining the annual reports of all manufacturing firms that disclosed information on CNINFO in 2017, after a series of screening work, and finally through the processing and analysis of the annual reports of 260 firms, the following conclusions are drawn:

First, through the regression analysis of the relevant data of 260 firms, it is finally verified that the servitization has a positive impact on firm performance. This means that for manufacturing firms, the adoption of servitization can indeed affect the improvement of firm performance.

Second, marketing ability can moderate the relationship between servitization and firm performance. Although the research results are not completely consistent with the experimental hypothesis of this paper, it can not be denied that marketing ability can indeed moderate the relationship between two variables. It should be noted that marketing investment intensity positively moderates the relationship between service level and firm performance, while the proportion of salespeople negatively moderates the relationship between service investment intensity and firm performance.

Although some measures have been taken to reduce the experimental error, some limitations are still inevitable due to the limitations of the obtained data. The limitations of this study mainly come from the data. The data of this paper comes from the annual report disclosed by firms on the COINFO, while the information related to firm service is relatively limited in the annual report, which limits the selection of independent variables in this paper to a certain extent, making the selection of experimental variables not comprehensive enough, which may have a certain impact on the specific experimental results. In addition, the data studied in this paper are cross-sectional data without panel data, so it is difficult to exclude the influence of year. Because at this stage, China's manufacturing industry is still a very important part of the national economy. The use of cross-sectional data fails to take political and other factors into account, which may also affect the experimental results.

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