

After Power Rationing, Small and Medium-sized Manufacturing Enterprises Production and Management Difficulties and Broken

Caihong Gao*, Hexin Zhang

Business School, Foshan University, Foshan, 528000, China

Abstract

In this paper, 876 small and medium-sized manufacturing enterprises in Foshan, a pilot city for the transformation and upgrading of the manufacturing industry, are investigated. Through questionnaire survey and logistic regression model, the difficulties of production and operation and the factors affecting the transformation and upgrading of the enterprises are analyzed. The results show that the business income of the enterprises is declining and the capital turnover is difficult. The price of raw materials purchased by enterprises rises, and the restart of equipment causes losses; Reduced wages and jobs for employees; Enterprises lack technical talents, financing sources and financing guarantees, and technology upgrading is hindered; Research and development ability, government subsidies, brand effect, key resources and other factors have a significant positive correlation with the transformation and upgrading of enterprises.

Keywords

Small and Medium-sized Manufacturing Enterprises; Production and Management; Transformation and Upgrading; Dilemma; Broken Game.

1. Introduction

At present, the research and analysis of power rationing mainly focus on the causes and effects, while the dilemma facing enterprises is production and operation, transformation and upgrading. First, the difficulties and countermeasures of manufacturing production and management. At present, China's manufacturing enterprises are faced with problems such as the rapid rise in production costs, greater difficulty in financing, imbalance of capital supply and demand of small and medium-sized enterprises, lack of talents, and low management level [1]. In view of the problems faced by manufacturing enterprises, the government can reduce the burden on enterprises by reducing taxes and fees, reducing taxes and fees for enterprises. Enterprises can get out of difficulties by innovating business models, using capital market financing and focusing on talent training [2]. Second, related research on the transformation and upgrading of manufacturing industry. At present, China's manufacturing enterprises are faced with such problems as imperfect human resource management system, financial constraints on transformation and upgrading, and insufficient innovation driving force [3]. Third, research on the factors that affect the transformation and upgrading of enterprises that stay up late. Factors such as enterprise innovation ability, enterprise scale, external market structure, and whether enterprises realize business model transformation will affect transformation and upgrading [4]. Fourth, research on power rationing. The first is the rationing, with supply briefly outstripping demand, government approvals slowing and insufficient investment in electricity. Secondly, the supply of thermal coal and drought and low rainfall affect the power supply, and finally, the long cycle of power investment, power planning and investment mechanism will be limited [5]. The policy of power rationing must be based on realistic conditions; As far as possible, between the market and administrative means, it should be done through the market rather than through simplified but costly administrative forces [6].

In the context of power rationing, in terms of coping with transformation and upgrading, digitalization and low-carbon in the future are the trends, but digitalization is the most certain among all uncertainties in the future [7]. Finally, under the background of power restriction, the supply chain of enterprises and the return of employees are constrained, and the cash flow pressure of micro, small and medium-sized enterprises to maintain and restore operation during this period is greater [8] By taking Anhui Province as the research object, it is found that the high-quality development of manufacturing industry is currently faced with difficulties in terms of weak innovation strength, insufficient coordinated development, weak green transformation and low level of openness. Under the background of the strategic goal of "manufacturing strong province", it is necessary to speed up the high-quality development of manufacturing industry, adhere to the road of technological innovation, pursue the social benefits of industrial development, and form the competitive advantage of the development of manufacturing industry in Anhui Province, in order to drive the development of higher quality of Anhui economy. Most of the above studies explored the production and operation problems of manufacturing industry or the challenges faced by transformation and upgrading at the macro level, while few literatures analyzed the problems faced by small and medium-sized manufacturing industry at the micro level under the background of power rationing. Therefore, this paper uses logistic regression model to conduct theoretical exploration of factors affecting the transformation and upgrading of the manufacturing industry, and analyzes the production and operation difficulties of small and medium-sized manufacturing enterprises in Foshan City.

2. Factors Affecting the Transformation and Upgrading of the Manufacturing Industry

2.1. Influencing Factors and Assumptions of Enterprise Transformation and Upgrading

The transformation and upgrading of manufacturing enterprises are affected by multiple factors. According to the research results of previous scholars, the main factors affecting the transformation and upgrading of manufacturing enterprises include the R&D ability of enterprises, government subsidies, marketing mode, technical ability, key resources, brand effect and the overall education level of enterprises. This paper mainly analyzes the impact of these factors on the transformation and upgrading of small and medium-sized manufacturing industries under the background of power rationing. In this regard, the following hypothesis is proposed:

Hypothesis 1: R&D capability is positively correlated with the transformation and upgrading of manufacturing industry;

Hypothesis 2: Government subsidies are positively correlated with the transformation and upgrading of the manufacturing industry;

Hypothesis 3: Marketing model innovation is positively correlated with manufacturing transformation and upgrading;

Hypothesis 4: There is a positive correlation between senior human capital input and manufacturing transformation and upgrading;

Hypothesis 5: There is a positive correlation between innovation capability and manufacturing transformation and upgrading;

Hypothesis 6: Brand effect is positively correlated with the transformation and upgrading of manufacturing industry;

Hypothesis 7: Education level is positively correlated with the transformation and upgrading of manufacturing industry.

2.2. Model Selection and Construction

This part explores the impact of research and development ability, government subsidies, marketing mode, key resources, innovation ability, brand effect, education level and other factors on the transformation and upgrading of enterprises. Since "whether enterprises transform and upgrade" is a binary discrete variable, we choose Logistic regression model for analysis.

Logistic model is a kind of nonlinear classification statistical method, which provides analysis results in the form of event probability, and is widely used in the study of influencing factors of things. The dependent variables of Logistic regression can be binary or multi-categorical. The dependent variable studied in this paper has only two values of identification (value 1) and disapproval (value 0), which meet the applicable conditions of nonlinear binary selection model. Based on this, this paper selects binary Logistic regression model to conduct quantitative research on the factors affecting the degree of enterprise transformation.

Let χ_k ($k=1, \dots, n$) is the independent variable that affects the dependent variable y , ρ is the probability of the dependent variable taking 1, and the Logistic probability function is:

$$y = \ln \frac{\rho}{1 - \rho} = b_0 \quad (1)$$

$$\rho = \frac{\exp\left(b_0 + \sum_{k=1}^n b_k \chi_k\right)}{1 + \exp\left(b_0 + \sum_{k=1}^n b_k \chi_k\right)} \quad (2)$$

Where: b_0 represents a constant term; b_k ($k=1, 2, \dots, n$) is the partial regression coefficient of Logistic regression, indicating the degree of influence of variables on $\text{logit}(\rho)$ when other conditions remain unchanged; χ_k is the k factor that affects the degree of enterprise transformation.

2.3. Variable Setting and Descriptive Statistics

Determination of dependent variables: The purpose of the research is to analyze the influencing factors of enterprise transformation and upgrading. The questionnaire is set as "Do you agree that the enterprise has been transformed and upgraded", and the answers are set as "Yes" (defined as $y=1$) and "no" (defined as $y=0$).

Setting of independent variables: Based on the relevant researches of scholars and the information collected by field investigation, 7 variables were selected for investigation and analysis. They are respectively the proportion of internal expenditure of R&D funds in the main business income, the intensity of government subsidies to enterprises, the proportion of enterprises' e-commerce transaction activities, the investment of enterprises in advanced human capital, the number of authorized applications for domestic inventions and utility model patents, brand effect, and the level of education. Descriptive statistics of variables: The descriptive statistics of dependent variable whether the enterprise is transformed and upgraded and independent variable are shown in Table 1.

Table 1. Descriptive statistics analysis table

Variable Name	Minimm	Maximm	mean	standard deviation
Whether the enterprise has been transformed or upgraded	0	1	0.65	0.493
The proportion of internal expenditure of R&D funds in main business income X1	0	4	3.57	0.234
The intensity of government subsidies to enterprises X2	0	4	2.04	0.457
Proportion of enterprise e-commerce transaction activity X3	0	4	3.73	0.254
Level of investment in advanced human capital X4	0	4	2.87	0.134
Number of authorized applications for domestic invention and utility model patents X5	0	4	2.34	0.356
Brand effect X6	0	4	3.77	0.054
Education level X7	0	4	1.85	0.632

Description: strongly disagree =0; Less agree =1; Basic identification =2; Comparative identification =3; Strongly agree =4.

Whether the enterprise has been transformed and upgraded: Yes =1; Not =0.

3. Fit Test and Model Regression Results

3.1. Fit Test

In this paper, SPSS26.0 statistical software was used to normalize the data, and then Logistic regression processing was carried out, and the prediction accuracy of the model was 98.5%. Table 2 shows the overall effect and parameters of the model. As shown in Table 3-2, Omnibus test and Hosmer and Lemeshow goodness of fit test for model coefficients were adopted in this paper. In Omnibus test, the chi-square values of steps, blocks and models are all the same, $P=0.000<0.05$. Through the significance test, it means that at least one variable among the seven input independent variables X1,X2,X3,X4,X5, X6 and X7 can effectively explain the sample's judgment result on whether the enterprise is transformed and upgraded. As for which several independent variables can be known according to the estimation results of the significance of individual parameter coefficients. In the Hosmer and Lemeshow tests, the chi-square value of the model is 4.884, and the associated probability $P=1.000>0.05$ is not significant, and the fit of the global regression model is good, indicating that the independent variable can effectively explain the dependent variable.

Table 2. Summary of overall model fit test

method of calibration	test value	P
Omnibus	142.903	0.000
Hosmer and Lemeshow test	4.844	1.000

3.2. Model regression results

Table 3. Model estimation structure

independent variable	B	Wald	sig	Exp(B)
X1	1.581	14.155	0.000	1.375
X2	0.603	8.245	0.004	1.828
X3	0.319	5.267	0.022	1.475
X4	1.633	18.582	0.000	1.364
X5	0.747	4.985	0.016	2.142
X6	0.278	3.635	0.039	1.425
X7	0.098	0.389	0.533	0.917
constant	-8.059	17.387	0.000	0.000

Table 3 shows the parameter estimation of the significance of individual independent variables in the regression model. X1 represents the proportion of internal R&D expenditure in the main business income of the enterprise, X2 represents the government's subsidy to the enterprise, X3 represents the proportion of enterprise e-commerce transaction activities, X4 represents the enterprise's investment in advanced human capital, X5 represents the number of domestic invention and utility model patent applications authorized. As can be seen from the table, the Wald test value of six variables, X1, X2, X3, X4, X5 and X6, reached the significant level of 0.05, so these six variables can be important predictive variables to explain whether an enterprise is transformed and upgraded. Suppose that the probability of whether a certain factor leads to the transformation and upgrading of an enterprise is P, and then write the Logistic regression model as follows:

$$\log \frac{\rho}{(1-\rho)} = 1.581\chi_1 + 0.603\chi_2 + 0.319\chi_3 + 1.633\chi_4 + 0.745\chi_5 + 0.278\chi_6 + 0.098\chi_7 - 8.059 \quad (3)$$

$$\rho = \frac{e^{(1.581\chi_1 + 0.603\chi_2 + 0.319\chi_3 + 1.633\chi_4 + 0.745\chi_5 + 0.278\chi_6 + 0.098\chi_7 - 8.059)}}{1 + e^{(1.581\chi_1 + 0.603\chi_2 + 0.319\chi_3 + 1.633\chi_4 + 0.745\chi_5 + 0.278\chi_6 + 0.098\chi_7 - 8.059)}} \quad (4)$$

According to this model, the probability of enterprise transformation and upgrading will be increased by 37.5% for each unit increase in recognition of the proportion of enterprise R&D expenditure (Exp=1.375, p=0.000<0.05). When the degree of recognition of government subsidy intensity increases by one unit, the probability of enterprise transformation and upgrading will increase by 82.8% (Exp=1.828, p=0.004<0.05). The probability of transformation and upgrading of enterprises will increase by 37.5% for each unit increase in the proportion of e-commerce transaction activities (Exp=1.375, p=0.022<0.05). The probability of transformation and upgrading will be increased by 36.4% for each unit increase in the recognition of high-level human capital investment (Exp=1.364, p=0.000<0.05). More patents for domestic invention and utility model can promote the transformation and upgrading of enterprises by 2.142 times than that for smaller patents (Exp=2.142, p=0.016<0.05). Better brand effect is 1.425 times more effective than worse brand effect in promoting enterprise transformation and upgrading (Exp=1.425, p=0.039<0.05).

According to the model test results, the following seven aspects were analyzed:

3.2.1. The Impact of the Proportion of R&D Expenditure in Main Business Income on the Transformation and Upgrading of Enterprises

According to the regression results, at the significance level of 5%, the proportion of internal R&D expenditure in main business income of small and medium-sized manufacturing enterprises has an obvious positive promoting effect on the transformation and upgrading of enterprises. R&d investment plays a crucial role in the transformation and upgrading of enterprises, and actively developing new products can better promote the transformation and upgrading of enterprises. So hypothesis 1 is true.

3.2.2. Influence of Government Subsidies on Enterprises' Transformation and Upgrading

In the regression results, at the significance level of 5%, government subsidies for small and medium-sized manufacturing enterprises have an obvious positive promoting effect on the transformation and upgrading of enterprises. As a policy signal, government subsidies can change the product structure and export structure of the industry by supporting specific enterprise groups. So hypothesis 2 is true.

3.2.3. The Impact of Enterprise E-commerce Transaction Activities on Enterprise Transformation and Upgrading

In the regression results, under the significance level of 5%, the e-commerce transaction activities of enterprises have a significant positive promoting effect on the transformation and upgrading of enterprises. The increase of e-commerce activities also reflects that the marketing mode of enterprises has shifted from the traditional mode to the new online mode, thus promoting the transformation and upgrading of enterprises. So hypothesis 3 is true.

3.2.4. Influence of High-level Human Capital Investment on Enterprise Transformation and Upgrading

In the regression results, at the significance level of 5%, the investment in advanced human capital has a significant positive promoting effect on the transformation and upgrading of enterprises. When the promotion effect of advanced human capital on the upgrading of the manufacturing industry is strong, in the process of accelerating the accumulation of human capital, it is easier to lead the capital and technology-intensive industries into the high-end field of manufacturing. So hypothesis 4 is true.

3.2.5. Impact of Innovation Capability on Enterprise Transformation and Upgrading

In the regression results, under the significance level of 5%, the number of domestic invention and utility model patent applications has a significant positive promoting effect on the transformation and upgrading of enterprises. This shows that we should increase support for enterprise independent innovation, build more technological innovation platforms, establish a sound investment and financing system, promote enterprises to carry out technology research and development, promote the improvement of enterprise innovation ability, and better promote the transformation and upgrading of enterprises. So hypothesis 5 is true.

3.2.6. Influence of Brand Effect on Enterprise Transformation and Upgrading

In the regression results, under the significance level of 5%, the better the brand effect, the more it can promote the transformation and upgrading of enterprises. This shows that a good brand effect can continue to improve the operation capacity of the enterprise, strengthen the brand effect and speed up the turnover, achieve the improvement of efficiency and scale, and promote the transformation and upgrading of the enterprise. So hypothesis 6 is true.

3.2.7. Influence of Education Level on Enterprise Transformation and Upgrading

According to the above regression results, the regression coefficient of education level is not significant, so the influence of this factor on the transformation and upgrading of enterprises is not significant, and it can be seen that this factor does not affect the transformation and upgrading of small and medium-sized manufacturing enterprises.

To sum up, the higher the proportion of internal R&D expenditure in the main business income, the greater the government subsidy to the enterprise, the more it can promote the transformation and upgrading of the enterprise. The higher the proportion of e-commerce transactions and the higher the investment in senior human capital, the more conducive to the transformation and upgrading of enterprises. The more the number of domestic invention and utility model patent applications are authorized, the better the brand effect is, the more it can promote the transformation and upgrading of enterprises.

4. Conclusion and Policy Recommendations

4.1. Conclusion

4.1.1. Difficulties in Production and Operation of Small and Medium-sized Manufacturing Enterprises

(1) The preparation time of small and medium-sized manufacturing enterprises is urgent, and it is difficult to make reasonable planning for their own production. Under the background of power rationing, first of all, most enterprises say that the notice time after receiving the power rationing is more urgent, and it is difficult to arrange production reasonably. After the implementation of the power rationing policy, more than half of the enterprises need to readjust the attendance of different positions. Secondly, due to power rationing, some enterprises also need to use small generators for production, which increases the difficulty of coordination between production and operation of enterprises.

(2) Under the impact of power rationing, the capacity utilization rate of small and medium-sized manufacturing enterprises is insufficient. The utilization rate of equipment production capacity of an enterprise refers to the ratio of the actual capacity of the enterprise equipment to the capacity of the enterprise equipment at full load. This index can reflect the capacity utilization efficiency of the enterprise. For capacity, nearly half of the affected enterprises can only reach 50%-80% of the normal production level, which indicates that the output or production efficiency of these manufacturing enterprises has been reduced a lot after being affected. However, the daily production and operation expenditure of enterprises has not been reduced compared with that before the power limit, which has brought huge pressure to small and medium-sized manufacturing enterprises.

(3) Power rationing has increased the procurement cost of small and medium-sized manufacturing enterprises. Under the impact of power rationing, nearly a quarter of small and medium-sized manufacturing enterprises said that the price of raw materials has increased. The unit price of raw materials and products directly affects the profits of enterprises and is the two most sensitive elements in the process of production and operation. Due to power rationing, many companies reflect that power rationing restart equipment also brings losses, which to a certain extent increased the cost of the enterprise at the production end resulting in insufficient supply.

(4) Under the influence of power rationing, small and medium-sized manufacturing enterprises are facing difficulties in capital turnover. Capital is the blood of enterprise operation, and insufficient liquidity affects the enterprise's anti-risk ability. 38.9% of enterprises can deliver goods on time although they have difficulties in capital turnover. However, after the power limit, the operating income of some enterprises in the current period fell by 10%-30% compared with the same period last year. It can be seen that the impact of power rationing on the revenue of enterprises is great, and the revenue of most enterprises is declining, indicating that enterprises have some difficulties in capital turnover and operating income.

(5) The difficulty of on-time delivery leads to the risk of default for small and medium-sized manufacturing enterprises. The survey shows that the notice of power rationing is more sudden, the mobility of personnel is weakened and the production is blocked, which will lead to some enterprises being unable to complete the production task according to the regulations. Therefore, the products of some enterprises are difficult to produce on time, and the enterprises have faced the risk of failing to deliver the contracts signed.

(6) The operation of small and medium-sized manufacturing industries is hindered, so the employment of enterprises is reduced. The survey results show that after the power rationing, although the wage level paid to employees is basically unchanged, the production of enterprises

can not be carried out normally, leading to some positions in the state of "out of business", so that some jobs have declined compared with before the impact.

(7) Small and medium-sized manufacturing enterprises are difficult to carry out clean production due to the lack of corresponding equipment. The lack of electricity supply has forced companies to transform and adopt cleaner production. Due to the difficulties faced by enterprises in installing solar panels, nearly 70% of enterprises have difficulty in obtaining installation information and channel support. And nearly 64% of enterprises believe that solar panel installation is difficult to achieve a reasonable input-output ratio of low, the use of solar panels in manufacturing is unstable.

4.1.2. Transformation and Upgrading of Small and Medium-sized Manufacturing Enterprises

(1) Since the power limit, many small and medium-sized manufacturing enterprises have said that it is difficult to recruit suitable technical personnel, and some high-tech manufacturing enterprises have said that they lack relevant technical and management design talents. Even if the recruitment to the enterprise adaptation cycle is very long, but due to the sluggish development of the enterprise may lead to the corresponding talent can not adapt to leave. There will even be talent fault, talent supply can not meet the operation and development needs of small and medium-sized manufacturing enterprises, so it is difficult for enterprises to achieve high-quality product production, and because of the lack of talent, enterprises are also facing great difficulties in technological upgrading.

(2) Under the impact of power rationing, some small and medium-sized manufacturing enterprises said that the use of electricity restrictions caused the current production capacity of the enterprise is insufficient, and the business situation is not ideal. Faced with the difficulties of production and operation, some managers have limited management experience and ability, and it is difficult to complete the work of related technology management and technology upgrading.

(3) The enterprise lacks the capital budget required for the production activities of technological transformation, has no financing source, and lacks credit guarantee. Under the influence of power rationing, the technical level of small and medium-sized manufacturing enterprises is insufficient, and the lack of funds has led to the situation that some enterprises want to carry out technological transformation but do not dare to turn. However, factors such as the greater risk of transformation, the lack of financing sources for enterprises, and the lack of suitable guarantee institutions have prevented small and medium-sized manufacturing enterprises from further technological upgrading to produce high-quality products.

(4) There is a high correlation between the innovation ability of small and medium-sized manufacturing enterprises and the transformation and upgrading of enterprises. Enterprise innovation ability is the key factor of enterprise transformation and upgrading, and small and medium-sized manufacturing enterprises with stronger innovation ability are more inclined to transformation and upgrading. Therefore, when the innovation ability of small and medium-sized manufacturing enterprises is insufficient, it is difficult to carry out innovation activities, which will hinder the transformation and upgrading of enterprises. In addition, research and development capabilities, government subsidies, marketing model innovation, and key resources can significantly promote the transformation and upgrading of small and medium-sized manufacturing enterprises.

4.2. How to Break the Game

4.2.1. Suggestions for Small and Medium-sized Manufacturing Enterprises

(1) In view of the emergency situation of power rationing time, it is difficult for enterprises to make overall arrangements for production and operation, small and medium-sized

manufacturing enterprises must arrange special personnel to coordinate and communicate with the competent government departments and the power department, figure out the plan of subsequent power rationing, and win the greatest support for the company, so as to minimize the impact on production. At the same time, enterprises can also start production at different times and carry out production activities with the help of engines, solar power generation and other equipment when necessary.

(2) For the problem of insufficient capacity utilization of small and medium-sized manufacturing enterprises, enterprises can adopt a multi-pronged approach of digestion, transfer, integration and elimination to resolve excess capacity. Tap the market potential and digest a number of excess capacity. At the same time, it is also necessary to pay attention to equipment utilization and technical efficiency in the case of economic and technical capacity to digest excess capacity on the one hand is to expand market demand and create more demand conditions for product sales. On the other hand, it refers to the promotion of product consumption upgrading through technological innovation and product upgrading.

(3) In response to the rising procurement costs of enterprises, manufacturing enterprises should tap their own potential, effectively control all aspects of procurement through reasonable, scientific and effective measures, change the traditional procurement methods, and strive to reduce the procurement costs of enterprises to achieve the purpose of maximizing benefits, so as to enhance the core competitiveness of manufacturing enterprises.

(4) In view of the capital turnover difficulties of manufacturing enterprises, enterprises can carry out information management of enterprise funds, and the optimal allocation of financial management can reasonably determine the inflow and demand of funds, thus speeding up the pace of capital turnover. Therefore, small and medium-sized manufacturing enterprises should constantly improve the level of financial management. At the same time, enterprises should also carry out scientific and effective management of their inventory funds. The first thing to do in inventory management is to achieve effective transportation, reduce circulation links as much as possible, and accelerate the circulation of funds.

(5) For small and medium-sized manufacturing enterprises facing the risk of default of trade partners, enterprises should carefully study the signing and execution of contracts to avoid contract risks. Business personnel should try their best to take the initiative in negotiations when negotiating business. In order to track the implementation of the contract, beware of the other party to use the change of any terms in the contract fraud, once the accident occurs, to seriously investigate and scientific analysis and at the least cost to resolve the contract risk. Small and medium-sized manufacturing enterprises need to establish their own information and intelligence systems, domestic political, economic and legal policy trends, timely grasp consumer preferences, product supply and demand conditions and changes in the foreign exchange market, and through processing and sorting, study the risk events that may be caused by various risk factors, so that enterprises can carry out hedging and other businesses as soon as possible to neutralize market risks.

4.2.2. Suggestions for the Transformation and Upgrading of Small and Medium-sized Manufacturing Enterprises

(1) In view of the difficulty in satisfying the technical personnel positions of small and medium-sized manufacturing enterprises, the introduction and selection of enterprises can enable enterprises to obtain all kinds of outstanding talents to fill key positions, lead or guide the staff to work actively, and appropriate human input can improve labor productivity, improve economic benefits, give play to the advantages of cooperation, and achieve the purpose of reducing staff and increasing efficiency. Secondly, by carrying out various training methods, enterprises can improve the management, technology, production and operation capabilities of employees to varying degrees so as to enhance the overall quality of enterprises to meet the

needs of modern manufacturing production and market competition. Third, small and medium-sized manufacturing enterprises can mobilize the enthusiasm and creativity of employees through various incentive ways and methods, improve production efficiency and economic benefits, and then promote the transformation and upgrading of enterprises.

(2) For small and medium-sized manufacturing enterprises do not have enough capital budget and investment problems, Small and medium-sized manufacturing enterprises can rely on accounts receivable, inventory insurance and other means to finance, or by integrating into the upstream and downstream supply chain to finance, at the same time, some high-tech manufacturing enterprises can also present to banks to obtain credit loans. Enterprises should also make full use of various preferential policies of the government and various forces of the capital market to improve the efficiency of capital use. Prevent the risk of breaking the chain of funds, so as to improve financing difficulties and expensive financing problems.

(3) In view of the insufficient innovation activities and limited innovation ability of small and medium-sized manufacturing enterprises, enterprises can increase the investment in innovation resources and strengthen the support of various scientific and technological innovation elements to solve the problem. Moreover, local universities and research institutes are the most important gathering places for local talents, and they have more perfect research facilities and better research environment than enterprises. Therefore, small and medium-sized manufacturing enterprises should take the initiative to strengthen cooperation with local universities and research institutes. The transformation and upgrading of enterprises can be further promoted by the talents of enterprises themselves and universities.

4.2.3. Policy Recommendations for the Government

(1) The government should improve the overall production plan and promote clean energy production. Most small and medium-sized manufacturing enterprises are more inclined to limit power on weekends, so the government should adjust the power limit schedule for different enterprises. For enterprises that can transform and upgrade, they should further strengthen the construction of multi-energy complementary clean energy, vigorously develop energy storage, optimize cross-regional power transmission and adopt a combination of distributed and centralized energy use to fill the power gap in a timely manner.

(2) The government can fully assist small and medium-sized manufacturing enterprises to resolve the risk of order default by building a public welfare platform. In the context of power rationing, enterprises are very likely to have the risk of large-scale default, especially in the face of foreign customers, smes lack crisis public relations and legal resources, such as default, smes will face high default costs. At this time, the government should actively play an intermediary role and build a corresponding communication and assistance platform, such as calling on the lawyers Association to set up a special coordination team of public interest lawyers to assist small and medium-sized manufacturing enterprises to solve the default risk that may occur or has occurred.

(3) The government can promote tax incentives and increase the strength of guarantees to reduce the pressure on the capital turnover of enterprises. First of all, the government needs to introduce corresponding policies to appropriately reduce or suspend the value-added tax of small and medium-sized manufacturing enterprises seriously affected by the epidemic, and reduce social insurance premiums in stages. Quarterly tax concessions can be provided during the power rationing period to reduce the financial pressure in the first half of the year. Secondly, some enterprises have a greater impact on limited electricity, but they have the prospect of transformation and upgrading, and the government can consider moderate subsidies. Finally, the government should continue to increase its support for guarantee institutions, further improve the risk sharing and risk compensation mechanism of guarantee institutions, improve the re-guarantee system, and create a good policy environment for bank guarantee cooperation

to jointly promote the development of small and medium-sized enterprises while continuing to implement policies such as incentives, financial support and tax incentives.

(4) By optimizing the coordination of power dispatch and increasing the consumption of clean energy, the government power grid department needs to make full and reasonable use of primary energy, so that the whole power grid can operate under the conditions of the lowest power supply cost or the lowest power consumption rate and network loss rate. It is necessary to establish and improve a new generation of power system, improve the adjustment capacity of the system, and improve and implement the guarantee mechanism, strengthen evaluation and assessment, and promote the main body of manufacturing enterprises to make greater use of renewable energy.

References

- [1] Xu He-Lian, Cheng Li-Hong, Sun Tian-yang. The increasing effect of manufacturing input service on Export domestic Value added of enterprises: Based on the experience of China's manufacturing micro-enterprises [J]. *China Industrial Economy*,2017,10:62-80.
- [2] LI Yuchao. Difficulties faced by China's manufacturing industry and Countermeasures [J]. *Business Times*,2012,36:98+125.
- [3] Liu Zhibiao, Wang Jianyou. Manufacturing overcapacity and industrial upgrading strategy [J]. *Economist*,2000,01:64-69.
- [4] Ma Fenghua, Li Jiangfan. Research trends of servitization dilemma in manufacturing industry[J]. *Science and Technology Progress and Countermeasures*,2019,3616:155-160.
- [5] Will the performance Dilemma of manufacturing firms promote innovation? An analysis based on the expansion of the dimension of expectation Gap [J]. *Chinese Industrial Economy*,2018,08:174-192.
- [6] Zhang Zhiyuan, Li Juanjuan. Research on high-quality development of Northeast Manufacturing Industry from the perspective of new and old kinetic energy conversion [J]. *Changbai Journal*,2021, 03:109-119.
- [7] XUE Shuang, Hong Yun, Chen Xin. Equity nature, political relationship and local government power rationing: Empirical evidence from non-ferrous metals industry [J]. *Journal of Financial Research*, 2013, 3:130-142.
- [8] Yuan Kaihua, Li Houjian. Official characteristics, incentive mismatch and government regulation behavior distortion: An empirical analysis of power rationing in Chinese cities[J].*Review of Public Administration*,2015,806:59-82+186-187.
- [9] Zhu Ganwei. Analysis of local government's Policy implementation behavior: A case study of "power rationing" [J]. *Journal of Xi 'an Jiaotong University (Social Science Edition)*,2012,3202:40-46.
- [10] Guo Keshu, Peng Jizong. The strategic position and role of manufacturing industry in China's new development stage[J]. *SocialSciences in China*,2021,05:128-149+207.
- [11] Lv Tie, Liu Dan. High quality development of manufacturing industry: Gaps, problems and measures [J]. *Learning and Exploration*,2019,01:111-117.
- [12] Li Chunmei. Evaluation of development quality of China's manufacturing industry and analysis of its influencing factors: An empirical study from panel data of manufacturing industry [J]. *Economic Problems*,2019, 8:44-53.
- [13] Gao Guangbo, Hou Jingchuan. China's Manufacturing Industry from the perspective of Industry4.0: Dilemma, motivation and Orientation[J].*Theoretical Perspective*,2015,11:46-48.
- [14] Zhong Chunyang. Research on the transformation and upgrading of small and medium-sized enterprises from the perspective of technological innovation: Based on the research data analysis of small and medium-sized enterprises in Ningbo City [J]. *Technical Economics and Management Research*,2015(04):77-81.

- [15] Liu Jin, Fu Zhengping, Fang Lun. Knowledge Graph Analysis of Manufacturing transformation and upgrading: Hot spots, evolution and Frontiers [J]. Science and Technology Management Research, 2020,4005:121-129.
- [16] Qin Kede, Qin Yue, Xu Changle, Xin Lin. Research on the transformation and upgrading of regional Manufacturing industry under the background of deep globalization of manufacturing industry: A case study of the transformation and upgrading of manufacturing industry in Jiaxing City, Zhejiang Province [J]. Science and Technology Progress and Countermeasures,2013,3022:43-47.