

# Study on the Effectiveness and Optimization of Guangxi's Fiscal Policy for Biomedical Industry\*

Yuwei Zhang

School of Public Policy & Management  
Guangxi University  
Nanning, China 530004

Yue Cheng\*\*

School of Public Policy & Management  
Guangxi University  
Nanning, China 530004  
\*\*Corresponding Author

**Abstract**—Due to the high input and high risk of the biomedical industry, its development is inseparable from the strong support of the government, especially the support of fiscal policy. The direct input of government fiscal funds, fiscal subsidies, government procurement and tax incentives have played an irreplaceable role in the development of the biomedical industry. This paper uses spss software to measure and analyze the effectiveness of Guangxi's fiscal policy for biomedical industry. It is found that the fiscal policy implemented by Guangxi to promote the development of biomedical industry has problems such as insufficient total fiscal input, low use of fiscal funds input, imperfect preferential tax policies, lack of systematicness and insufficient support for small and medium-sized enterprises. Corresponding countermeasures and suggestions for the above problems are put forward, so as to better promote the development of Guangxi's biomedical industry.

**Keywords**—Guangxi's biomedical industry; fiscal policy; effectiveness analysis

## I. INTRODUCTION

The biomedical industry is an emerging industry that combines modern advanced biotechnology with the traditional medical industry, and is the focus of bio-industry development. Compared with developed countries, China's biomedical industry started late and the technology level is relatively backward. The high input and high risk of the technical R&D activities in the biomedical industry have determined that it is far from enough for the improvement of the technical level of the entire industry and the industry development to rely only on the medical companies' own efforts, and it requires the help of government to support its development by introducing various policies. The government has played a decisive role in the process of improving the innovation capacity and sustainable development of China's biomedical industry.

The biomedical industry is a strategic emerging industry supported by the national "Twelfth Five-Year Plan" and the "Thirteenth Five-Year Plan", and also a key industry

cultivated in Guangxi. In recent years, Guangxi Zhuang Autonomous Region has introduced policies and plans such as Bio-industry Development Plan of Guangdong Zhuang Autonomous Region, the "Twelfth Five-Year Plan" for Guangxi Strategic Emerging Industry Development and the "Thirteenth Five-Year Plan" for Guangxi Strategic Emerging Industry Development to promote the development of the biomedical industry. After years of development, Guangxi biomedical enterprises have achieved good results. According to the statistics yearbook data, there were 409 medical companies in the entire region by 2016, including about 150 medical companies above designated size; the total output value of the medical industry exceeded 45 billion yuan, there were 22 institutions with drug R&D qualifications in the entire region; a number of medial industrial parks have been formed, such as the Biomedical Industrial Park of Nanning High-tech Zone and Baota Pharmaceutical Industrial Park. However, there is still a big gap compared with the developed regions in the east. The reason is closely related to Guangxi's support for the development of the biomedical industry. This paper studies the development of Guangxi's biomedical industry from the perspective of fiscal policy, proposes the optimization and improvement of fiscal policy based on evaluating the effectiveness of the current fiscal policy of Guangxi's biomedical industry and analyzing the existing problems and deficiencies, so as to enhance the competitiveness of Guangxi's biomedical industry and better promote its development.

## II. LITERATURE REVIEW

Most of the foreign countries have tested the effectiveness of government's fiscal policy for the biomedical industry through empirical study, and proposed corresponding policy recommendations, which greatly promotes the development of the biomedical industry. The empirical study of Grabowski Henry G, Moe Jeffrey L (2009) shows that government's active policies can stimulate the R&D of new drugs, and it recommends that government encourage companies to conduct drug R&D activities through targeted policies such as tax credits and early study funding, to promote the development of the biomedical industry [1]. JdeMello-Sampayo Felipa (2015) found through empirical study that government's fiscal policy will increase

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the R&D activities of pharmaceutical companies while reducing their tax. Government should consider subsidizing the profits of pharmaceutical companies to promote innovation in medicines [2]. Joonhwan Choi and Jaegul Lee (2017) used related data of the Korean biomedical industry for empirical analysis, and found that government’s subsidies for R&D activities stimulate private R&D activities of small biotech companies, indicating that government-provided R&D subsidies can successfully solve the problem of market failure in private R&D investment [3].

Domestic scholars' studies on the fiscal policy or biomedical industry mostly focus on the evaluation of policy effects and policy recommendations for industrial development. Ding Jinxi, Geng Lu, et al. (2011) conducted a questionnaire survey for quantitative analysis of the relevant data reflecting the effect of policy implementation. The results show that the financing policy and fiscal support policy play a greater role among government's policies on incentives for innovative drug R&D [4]. Wen Kaiyu (2012) conducted an empirical analysis of the impact of government’s science and technology policies on the R&D of the pharmaceutical industry. The research results show that government's input in research funds, tax incentives, government public investment, government financing guarantees, and input in scientific research personnel have a positive impact on technical R&D activities of companies [5]. Li Cuijie and Cao Yang (2010) analyzed the problems in the taxation policies of China's bio-pharmaceutical industry from three aspects of value-added tax, corporate income tax and personal income tax, and put forward the following suggestions for improving the taxation policies:

- Establish and improve the tax incentive system;
- Improve the corporate income tax system;
- Pay attention to the tax reduction and exemption in the production and circulation links;
- Strengthen the personal income tax preference [6].

Yang Hua (2015) analyzed the problems existing in the development of China's biomedical industry, and proposed suggestions on several aspects such as increasing fiscal input, improving fiscal and taxation policies to promote industrial innovation, promoting enterprise investment and financing, and increasing personnel training and attraction [7].

In summary, by sorting the research status of the fiscal policies of the biomedical industry at home and abroad, it can be found that the relevant research results at home and

abroad are relatively rich, which indicates that the implementation of fiscal policy to promote the development of biomedical industry has been widely concerned and valued by academic circles at home and abroad. In the process of testing the effectiveness of fiscal policies, foreign scholars often take the method of quantitative analysis, while most domestic scholars study the fiscal policies of the biomedical industry from the level of the entire country, and lack relevant studies specifically for local provinces and cities. Therefore, this paper chooses the fiscal policies of Guangxi for biomedical industry as the object of study, analyzes and demonstrates its policy effectiveness, and proposes corresponding countermeasures and suggestions based on this, so as to better promote the development of Guangxi’s biomedical industry.

### III. ANALYSIS ON THE EFFECTIVENESS OF GUANGXI’S FISCAL POLICIES FOR THE BIOMEDICAL INDUSTRY

#### A. Variable Selection

1) *Selection of input indicators that influence the effectiveness of fiscal policy:* In the selection of input indicators that influence the effectiveness of fiscal policy, based on a large amount of literature, this paper selects from the research results or indicators of Tang Xianjie, Li Xinyu (2012), Cheng Chen (2016), Li Donglin (2016), Chu Deyin, Ji Fan, Yang Shan (2017) and Song Jia (2013); based on data availability, this paper selects the government fund in R&D funds, taxation, enterprise fund in R&D funds and R&D personnel as the input indicators to measure the effect of fiscal policies.

2) *Selection of output indicators that influence the effectiveness of fiscal policy:* In terms of the output indicators that influence the effectiveness of fiscal policies, this paper selects from the research results or indicators of Liu Jianmin, Hu Xiaomei, Wang Bei (2013), Chen Cheng (2016), Jia Xiujian (2013), Zhao Xu (2015), Hu Jun (2015), Zheng Chunmei, Li Pei (2015) and Xiong Weiqin (2011); based on data availability, this paper selects the total output value of Guangxi’s pharmaceutical manufacturing industry, new product sales revenue and effective invention patents as indicators to measure the development and innovation performances of Guangxi’s biomedical industry. Therefore, the selection of indicators is shown in “Table I” below.

TABLE I. INPUT-OUTPUT INDICATORS FOR FISCAL POLICY IMPLEMENTATION EFFECT

	Primary Indicator	Secondary Indicator	Unit
<i>Government input</i>	Fiscal direct input	Government fund in R&D funds	10000 yuan
	Tax preference	Taxation	10000 yuan
<i>Enterprise input</i>	Capital input in scientific research activities	Corporate fund in R&D funds	10000 yuan
	Input in R&D personnel	R&D personnel	Person
<i>Output level</i>	Industrial development level	Total industrial output value	10000 yuan
	Level of technological innovation	Number of effective invention patents	pcs
		New product sales revenue	10000 yuan

**B. Data Sources**

This paper selects the indicator data of Guangxi pharmaceutical manufacturing industry in 2007-2016 from Guangxi Statistical Yearbook and China Statistics Yearbook on High Technology Industry. The data of industrial output

value and tax revenue mainly come from Guangxi Statistical Yearbook, government fund in R&D funds, corporate fund in R&D funds, R&D personnel, the number of effective invention patents, and the sales revenue of new products are from China Statistics Yearbook on High Technology Industry. (See “Table II”)

TABLE II. SAMPLE DATA OF GUANGXI ZHUANG AUTONOMOUS REGION IN 2007-2016

Year	Industrial Output Value (10,000 Yuan)	New Product Sales Revenue (10000 Yuan)	Number of Effective Invention Patents (Pcs)	Government Fund in R&D Funds (10000 Yuan)	Tax Revenue (10000 Yuan)	Corporate Fund in R&D Funds (10000 Yuan)	R&D Personnel (Person)
2007	960198	71855	55	547	60526	11626	1040
2008	982352	84415	52	1163	65378	12251	771
2009	1324139	136531	189	1449	83624	15721	1188
2010	1695622	169241	188	1060	97583	7454	779
2011	2267328	229938	166	1914	120056	34882	1776
2012	2653410	386574	183	2402	153369	30510	1780
2013	3379022	644991	234	2187	193535	33304	1722
2014	3847726	586372	237	2101	198457	34837	1695
2015	4389593	508554	275	2636	183549	38379	1811
2016	4753016	533594	381	2285	201864	34728	1571

**C. Correlation Analysis**

This paper uses spss software to analyze the correlation between input and output indicators. The results are as follows: (see “Table III”)

TABLE III. RESULTS OF CORRELATION ANALYSIS ON INPUT INDICATORS AND OUTPUT INDICATORS OF FISCAL POLICY (1)

Correlation								
		Total industrial output value	New product sales revenue	Number of effective invention patents	Government fund in R&D funds	Taxation	Corporate fund in R&D funds	R&D personnel
Total industrial output value	Pearson correlation	1	.916**	.899**	.858**	.962**	.838**	.752*
	Significance (two-tailed)		0.000	0.000	0.002	0.000	0.001	0.012
	Number of cases	10	10	10	10	10	10	10
New product sales revenue	Pearson correlation	.916**	1	.777**	.787**	.883**	.785**	.774**
	Significance (two-tailed)	0.000		0.008	0.003	0.000	0.003	0.009
	Number of cases	10	10	10	10	10	10	10
Number of effective invention patents	Pearson correlation	.899**	.777**	1	.750*	.849**	.774*	0.590*
	Significance (two-tailed)	0.000	0.008		0.013	0.002	0.032	0.032
	Number of cases	10	10	10	10	10	10	10
Government fund in R&D funds	Pearson correlation	.858**	.787**	.750*	1	.879**	.817**	.881**
	Significance (two-tailed)	0.002	0.003	0.013		0.001	0.000	0.001
	Number of cases	10	10	10	10	10	10	10
Taxation	Pearson correlation	.962**	.883**	.849**	.879**	1	.871**	.801**
	Significance (two-tailed)	0.000	0.000	0.002	0.001		0.001	0.005
	Number of cases	10	10	10	10	10	10	10
Corporate fund in R&D funds	Pearson correlation	.838**	.785**	.774*	.817**	.871**	1	.960**
	Significance (two-tailed)	0.001	0.003	0.032	0.000	0.001		0.000
	Number of cases	10	10	10	10	10	10	10
R&D personnel	Pearson correlation	.752*	.774**	0.590*	.881**	.801**	.960**	1
	Significance (two-tailed)	0.012	0.009	0.032	0.001	0.005	0.000	
	Number of cases	10	10	10	10	10	10	10
**. At the level of 0.01 (two-tailed), the correlation is significant.								
*. At the level of 0.05 (two-tailed), the correlation is significant.								

From the results of the correlation analysis, it can be found that the correlation among the government fund in R&D funds, the corporate fund in R&D funds, the new

product sales revenue, and the number of effective invention patents is not very high, and the possible reason is that there is a time lag in government’s capital input in scientific

research activities. The input in scientific research in the current year may not take effect in the current period, and the input effect may be reflected until a few years later. Therefore, this paper refers to the quantitative analysis method in Li Donglin's (2016) paper, and conducts a

correlation analysis of the government fund in R&D funds and the corporate fund in R&D funds with the current output indicators. The analysis results are as follows: (see "Table IV")

TABLE IV. CORRELATION ANALYSIS RESULTS OF THE INPUT INDICATORS AND OUTPUT INDICATORS OF FISCAL POLICY (2)

		Correlation						
		Total industrial output value	New product sales revenue	Number of effective invention patents	Government fund in R&D funds	Taxation	Corporate fund in R&D funds	R&D personnel
Total industrial output value	Pearson correlation	1	.916**	.899**	.930**	.962**	.876**	.752*
	Significance (two-tailed)		0.000	0.000	0.000	0.000	0.001	0.012
	Number of cases	10	10	10	10	10	10	10
New product sales revenue	Pearson correlation	.916**	1	.777**	.902**	.983**	.864**	.774**
	Significance (two-tailed)	0.000		0.008	0.000	0.000	0.001	0.009
	Number of cases	10	10	10	10	10	10	10
Number of effective invention patents	Pearson correlation	.899**	.777**	1	.890**	.849**	.869**	0.590*
	Significance (two-tailed)	0.000	0.008		0.007	0.002	0.009	0.032
	Number of cases	10	10	10	10	10	10	10
Government fund in R&D funds	Pearson correlation	.930**	.902*	.890**	1	.929**	.881**	.684*
	Significance (two-tailed)	0.000	0.000	0.007		0.000	0.001	0.029
	Number of cases	10	10	10	10	10	10	10
Taxation	Pearson correlation	.962**	.983**	.849**	.929**	1	.847**	.801**
	Significance (two-tailed)	0.000	0.000	0.002	0.000		0.002	0.005
	Number of cases	10	10	10	10	10	10	10
Corporate fund in R&D funds	Pearson correlation	.876**	.864**	.869**	.881**	.847**	1	.573
	Significance (two-tailed)	0.001	0.001	0.009	0.001	0.002		0.083
	Number of cases	10	10	10	10	10	10	10
R&D personnel	Pearson correlation	.752*	.774**	0.590*	.684*	.801**	.573	1
	Significance (two-tailed)	0.012	0.009	0.032	0.029	0.005	0.083	
	Number of cases	10	10	10	10	10	10	10
**. At the level of 0.01 (two-tailed), the correlation is significant.								
*. At the level of 0.05 (two-tailed), the correlation is significant.								

From the analysis results, it can be seen that the three investment indicators of government fund in R&D funds, taxation and corporate fund in R&D funds have a significant and high correlation with the total industrial output value, new product sales revenue and the number of effective invention patents; R&D personnel has a significant moderate correlation with the three output indicators of industrial output value, new product sales revenue and the number of effective invention patents.

*D. Evaluation and Analysis of the Effectiveness of Guangxi's Fiscal Policy for the Biomedical Industry*

From the correlation analysis, following conclusions can be drawn: the input indicators of government fund in R&D funds, taxation, corporate fund in R&D funds and R&D personnel have a significant and positive correlation with biomedical industry's three output indicators of total industrial output value, new product sales revenue and number of effective invention patents. That is, while the input indicators increase, the output indicators will also

increase. It indicates that the government's fiscal policy has a significant incentive effect on the improvement of technological innovation level and development of Guangxi's biomedical industry.

1) *Analysis of the effect of government R&D expenditure on promoting the development of biomedical industry:* According to the results of correlation analysis, the government's capital input in R&D activities has a significant positive correlation with the total industrial output value, which indicates to a certain extent that the government's technology funding will stimulate the enthusiasm of enterprises for new product R&D, thereby increasing the output value of the entire biomedical industry and promoting its development. However, compared with developed areas, there is still a big gap in the growth rate of Guangxi's biomedical industry. On the one hand, government's total fiscal input is insufficient, and government may also invest some of its funds in non-profit organizations, such as universities and research institutes. In addition, the industry-university-research integration among enterprises, universities and scientific research institutions is insufficient, causing the input policy not to fully function.

2) *Analysis of the effect of government R&D expenditures on promoting the innovation ability of biomedical industry:* According to the correlation analysis, it is found that there is a significant highly positive correlation between government's technology funding and the improvement of corporate innovation capabilities, indicating that while the government's capital input in R&D activities increases, the innovation capacity of the biomedical industry also increases. At the same time, according to the yearbook data, Guangxi biomedical industry owns a relatively small number of effective invention patents. There were only 381 patents in 2016, while Jiangsu and Zhejiang owned 4262 and 3410 patents respectively. It indicates that the incentive effect of government's fiscal policy on the innovation ability of Guangxi's biomedical industry needs to be enhanced. On the one hand, it is difficult to see immediate results of the input of government's research funding in the output of scientific and technological achievements in the current period, and there is a certain lag and needs a certain period of transition. At the same time, there is a lack of government department's supervision and management of the use of funds, so that the research funds that enterprises will receive from the government may not be fully used for scientific research, resulting in low utilization of funds.

3) *Analysis of the effect of government's tax incentives on enhancing innovation ability and promoting industrial development:* According to the results of correlation analysis, the government's taxation has a significant high correlation with the industry's output value, new product sales revenue and the number of effective invention patents, and the two develop in the same direction, indicating there is a close relation among the improvement of Guangxi

biomedical industry innovation, the development of the industry and the government's tax incentives. Through tax reduction and exemption for high-tech enterprises, government improves the innovation capability of pharmaceutical enterprises and the entire industry to a certain extent, drives the adjustment and upgrading of industrial structure, and promotes the rapid development of the biomedical industry. However, according to the data representing the relevant indicators of the industrial technology innovation level, the overall innovation ability of Guangxi biomedical industry needs to be improved, indicating that the tax incentives need to be further enhanced. Since Guangxi has not yet introduced tax incentives specifically for the biomedical industry, there is a lack of systematicness and pertinence, and the threshold of tax incentive conditions is high, many small and medium-sized pharmaceutical companies are difficult to enjoy preferential treatment, which weakens the enthusiasm for innovation, influences the improvement of the industry's overall innovation capability, and weakens the policy effect.

4) *Analysis of the effect of corporate R&D expenditure on improving innovation ability and promoting industrial development:* The R&D expenditure of enterprises has a highly positive correlation with the total industrial output value, new product sales revenue and the number of effective invention patents, indicating that the input of companies' own research fund is closely related to the improvement of the innovation capability improvement and development of the biomedical industry. It indicates that the government can stimulate enterprises to increase R&D expenditure through fiscal policy. In terms of fiscal input policy, the shortage of funds can be alleviated by providing low-interest or interest-free loans, fiscal subsidies, and fiscal transfer payments to pharmaceutical companies. In terms of fiscal revenue policy, income tax reduction and exemption, tax rebate, weighted deduction of R&D expenses, accelerated depreciation, etc. can be used to reduce the tax burden of pharmaceutical companies, stimulate enterprises to increase input in R&D funds, improve independent innovation capability, and promote the entire industry to develop well and quickly.

5) *Analysis of the effect of R&D personnel input on enhancing innovation ability and promoting industrial development:* The input of R&D personnel has a significant moderate correlation with the total industrial output value, new product sales revenue and the number of effective invention patents, indicating that the input of R&D personnel is not strongly related to the improvement of the innovation of the biomedical industry and its development, which may be caused by the big gap in high-tech talents required by Guangxi biomedical industry, the low density of employees, and weak talent team. According to statistics, there were 1571 researchers in 2016, which was far less than the developed provinces in the east. It indicates that government's fiscal policy to attract high-tech talents is not

significant, resulting in the lack of researchers engaged in Guangxi's biomedical industry.

#### IV. PROBLEMS IN GUANGXI'S FISCAL POLICIES FOR THE BIOMEDICAL INDUSTRY

##### A. *Insufficient Total Amount of Fiscal Input*

The fiscal input of Guangxi Zhuang Autonomous Region for the biomedical industry is mainly through the direct input of R&D funds, various fiscal subsidy policies, and the establishment of various special funds for support and guidance; although the input of fiscal funds has been continuously increased in recent years from 5.47 million yuan in 2007 to 22.85 million yuan in 2016, it still cannot meet the capital input required for the development of biomedical industry, and it still has a large gap compared with the fiscal input in developed regions in the east. According to the data of the statistical yearbook, the input of government research fund in the biomedical industry in Shanghai, Jiangsu and Zhejiang in 2016 was: 109.71 million yuan, 152.12 million yuan, and 176.92 million yuan, therefore, the autonomous region's input of fiscal funds in the biomedical industry needs to be further strengthened.

##### B. *Low Utilization of Fiscal Funds Input*

According to the data of the statistical yearbook, although the number of effective invention patents representing the industry's innovation ability in Guangxi biomedical industry shows a growing trend in the decade of 2007-2016, the total amount is still very small, and the number of effective inventions in 2016 was less than four hundred, while the number of effective invention patents in Jiangsu and Zhejiang reached 4262 and 3410 respectively. It shows that although the input of scientific research funds of the autonomous regional government can promote the increase of the number of effective invention patents in the biomedical industry, its impact is limited, and indicates that the government's research funds may not be fully used in R&D activities, and there may even be enterprises defrauding the government's fiscal funds; the lack of strong supervision of funds leads to the low utilization of government fiscal funds input to a certain extent.

##### C. *Imperfect Tax Incentives and Inadequate Systematicness*

Although the government's tax incentives for the biomedical industry have a certain incentive effect on the improvement of the industry's innovation level and development, its policy effects need to be strengthened. The number of effective invention patents representing the innovation capability of Guangxi biomedical industry increased from 55 to 381 in the decade of 2007-2016, while the number of effective invention patents in developed regions in 2016 was far greater than that in Guangxi. It can be seen that the government's tax incentives need to be further optimized. Since the current tax policies implemented by the autonomous region for the development of the biomedical industry are not perfect, a systematic tax system has not been formed. Most of the tax incentives are derived from the provisions of national basic tax laws such as the Corporate Income Tax Law, the Individual Income Tax Law

and the Value Added Tax Law, lacking tax regulations specifically for the biomedical industry. Moreover, these preferential policies are mainly scattered in the planning, notification and other documents issued by various departments, lacking coordination and systematicness. It has also brought some difficulties to policy implementation, and weakened the support and guidance of the biomedical industry to a certain extent.

##### D. *Insufficient Support for Small and Medium-sized Enterprises*

In addition to large-scale pharmaceutical companies in the industry, the improvement of the overall innovation capability of Guangxi's biomedical industry also relies on small and medium-sized technological pharmaceutical enterprises with innovative capabilities. An important reason for strengthening the incentive effect of government's fiscal policy in the improvement of the industrial innovation capability is the lack of the support for small and medium-sized enterprises, which is not conducive to the stimulation of innovation enthusiasm of small and medium-sized pharmaceutical enterprises, thus affecting the further improvement of the technological innovation level of the entire industry. At present, the fiscal input policy of Guangxi Zhuang Autonomous Region for the biomedical industry is mainly biased towards large enterprises and high-tech enterprises, while the capital input in small and medium-sized pharmaceutical enterprises is insufficient to effectively alleviate their financial pressure. In terms of taxation policies, since the standard for tax incentives is relatively high, general small and medium-sized pharmaceutical enterprises are difficult to meet the requirements of tax preferential conditions in terms of scale and profitability, and enjoy less tax incentives, thus affecting the innovation power of small and medium-sized enterprises, which is not conducive to the rapid improvement in the overall innovation capabilities of the biomedical industry.

#### V. SUGGESTIONS ON PERFECTING GUANGXI'S FISCAL POLICIES FOR THE BIOMEDICAL INDUSTRY

##### A. *Increasing Fiscal Input in Scientific and Technological R&D Activities*

For the high-tech industry represented by the biomedical industry, continuous technological innovation is the core and key to the rapid development of the industry and the continuous improvement of its competitiveness. To gain a place in the fierce competition in domestic market and even the international market, Guangxi's biomedical industry has to continuously enhance its innovation ability. Due to the huge capital input required for the technical R&D activities of the biomedical industry, and the high risk and uncertainty of the activities, it is difficult to continue with the strength of companies alone, and government needs to input a large amount of funds to support and ensure the smooth progress of technical R&D activities. Therefore, the autonomous regional government needs to increase the input of fiscal funds in the technical R&D activities of the biomedical industry, and provide financial support for scientific and

technological R&D activities and the transformation of scientific and technological achievements of Guangxi biomedical industry through direct input of fiscal funds, fiscal subsidies, scientific and technological achievements rewards, the establishment of various special funds and other means, and let fiscal expenditure policies play an irreplaceable role in improving the independent innovation capability of the entire industry and promoting the sustainable development of the industry.

#### *B. Paying Attention to Indirect Tax Incentives and Improving Tax Incentive Policies*

At present, the tax incentives for the biomedical industry are mainly based on direct incentives. Although the operation is simple and the transparency is high, some enterprises that have not yet made profits in the early stage of R&D will not be able to enjoy the tax incentive policies granted by the government. Most developed countries and regions take the method of tax incentives dominated by indirect incentive and supplemented by direct incentive, in which the focus of incentive is mainly put beforehand, and attention is paid to the tax incentives for the R&D link. The R&D risks of enterprises and financial pressure is relieved through pre-tax incentives. Therefore, it is necessary to pay attention to indirect tax incentives, and adopt preferential policies such as weighted deduction of R&D expenses, investment credits, and accelerated depreciation to guide pharmaceutical companies to increase input in scientific research and development, and improve the technical level of the entire biomedical industry. At the same time, it is necessary to introduce a tax incentive system specifically for the biomedical industry, establish a sound tax incentive system, and enhance the coordination and systematicness of policies.

#### *C. Attaching Importance to the Support of Small and Medium-sized Enterprises*

Due to the small overall size of small and medium-sized pharmaceutical enterprises, compared with large enterprises, their ability to withstand risks is weak and credibility is low, which leads to great difficulties in financing. Therefore, government needs to support small and medium-sized enterprises by means of fiscal policy, so as to solve the problem of financing difficulties for small and medium-sized pharmaceutical companies. In terms of fiscal expenditure policies, funds such as seed funds and venture funds can be established, and loans with discounted interest and credit guarantees can be used to expand funding sources for SMEs and provide financial support for their development. At the same time, government can provide fiscal subsidies for the scientific research projects of small and medium-sized pharmaceutical enterprises, give certain rewards to scientific research achievements, and encourage small and medium-sized pharmaceutical enterprises to carry out technical R&D activities. In terms of fiscal revenue policy, government can learn from the experience of developed countries, allow to deduct R&D expenses of SMEs in corporate income tax at a certain proportion, and bear certain losses for eligible SMEs, so as to reduce the R&D costs of SMEs, reduce business risks, stimulate the R&D enthusiasm of small and medium-

sized pharmaceutical companies, improve the ability of independent innovation, and promote the healthy development of SMEs.

#### *D. Improving the Supervision Mechanism and Performance Evaluation System of Funds*

The development of Guangxi biomedical industry is inseparable from the fiscal support provided by the government. To make the best use of the government's fiscal funds, it is necessary to supervise the use of funds and evaluate the effects of the policies. The government needs to continuously improve the supervision mechanism and performance evaluation system for fiscal funds. After the fiscal subsidies are issued to enterprises, it must supervise their use; pharmaceutical enterprises that receive government's fiscal subsidies should report the use of funds to the relevant departments on a regular basis, and the government should also conduct irregular inspections on them, to clearly master the use of fiscal subsidies for enterprises and regulates the use of fiscal funds. Enterprises that defraud the government's fiscal subsidies must be severely punished, a certain amount of fines must be imposed while recovering the subsidy funds, and such enterprises are disqualified from applying for fiscal subsidies.

## VI. CONCLUSION

This paper uses quantitative analysis to evaluate the effectiveness of Guangxi's fiscal policy for biomedical industry, and concludes that the government's fiscal policy has promoted the development of the biomedical industry to a certain extent. At the same time, it has found that Guangxi's fiscal policy for biomedical industry has the following problem:

- insufficient total fiscal input;
- low use of fiscal funds input;
- imperfect preferential tax policies, lack of systematicness;
- insufficient support for small and medium-sized enterprises.

Corresponding countermeasures and suggestions for the above problems are put forward, so as to provide reference and reference for the study of relevant policies of other provinces and cities. Since the data acquisition still has certain constraints, the financial incentive policies involved here are still relatively one-sided. For deeper aspects, it should be further discussed in the future research process.

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