ATLANTIS PRESS
Advances in Social Science, Education and Humanities Research, volume 176
2nd International Conference on Management, Education and Social Science (ICMESS 2018)

Analysis on Basic Research Situations in Jilin Province-Based on National Natural Science Foundation of China

Jing Liwei[1] Wang Guihua[1] Chen Yuan[1] Sun Ling[3] Chang Haiyan[4] Liu Jingyan[1] Tang Zhe[2*]
Jilin Province Science and Technology Information Institute, Changchun, Jilin 130033
Department of Science & Technology of Jilin, Changchun, Jilin, 130000
Changchun Library, Changchun, Jilin, 130021
Changchun Guanghua University, Changchun, Jilin, 130000

***Abstract*—The National Natural Science Foundation of China, as an important funding channel for promoting the basic researches in the new era, adhering to the strategic positioning of "funding the basic research and scientific frontier exploration, supporting the talent and team for building and enhancing the source innovation ability", has made a great contribution to build an innovative country and consolidate the scientific foundation for building a strong science and technology country in the world. In recent years, Jilin Province has solved some common basic and scientific problems through undertaking a series of scientific fund programs, cultivated and created a number of basic scientific research backbones and talents and also obtained a number of basic research innovation achievements. We conducted a detailed analysis on the status and existing problems with the fund in Jilin Province from National Natural Science Foundation of China during 2013 to 2017 as a research object and put forward some suggestions.**

Keywords—National Natural Science Foundation of China; Basic Research; Problem; Suggestion

I. INTRODUCTION

Basic research is an important cornerstone of scientific and technological advancement and innovation. The National Natural Science Foundation of China is an important channel for supporting basic researches in all provinces and also recognized as a research fund which is most fair and most standardized and can best reflect the abilities of the researchers in China by the subjects [1]. Since the establishment of the National Natural Science Foundation of China, the reforms and innovations have been continuously carried out, its funding system has been continuously perfected, its management level has been continuously improved, and the fruitful results have been yielded from the funding programs. With the support of the National Natural Science Foundation of China, the level of the basic research has been improved in Jilin Province, but there are still some aspects that need to be strengthened. All the data herein come from the statistics from the National Natural Science Foundation of China.

II. BASIC FUND WINNING SITUATIONS IN JILIN PROVINCE FROM THE NATIONAL NATURAL SCIENCE FOUNDATION OF CHINA

In recent years, the programs supported by the fund in Jilin Province from the National Natural Science Foundation of China have been increasing year by year, with a wide range and numerous varieties. These programs have effectively improved the level of basic research, better stimulated the enthusiasm of researchers in carrying out research in Jilin Province, and provided a lot of excellent innovative achievements for the social development, and played the full role of science and technology in promoting the economic and social development. The following will mainly describe the basic situations of the funding programs, and these programs mainly include: General Program, Youth Science Fund Program, Regional Science Fund Program, Key Program, National Outstanding Youth Science Fund Program, Overseas and Hong Kong-Macao Scholar Cooperative Research Fund Program, Outstanding Youth Science Fund Program, etc.

A. Basic Situations of General Program

In the past five years, the annual funding rate of the programs in Jilin Province from the National Natural Science Foundation of China has remained at above 22.0% (see Table 1 for details), with the average annual funding rate of 24.2%, which is higher than the national average (22.7%). In addition, the construction level of the local universities with superior characteristics and the disciplines in Jilin Province has also been recognized by the national level, among which, the annual average funding quota of Jilin University is ranked 17th in China, and the annual average funding quota of the disciplines such as chemistry, engineering and materials science, and life sciences are kept above 35 million yuan.

TABLE I. APPLICATION AND FUNDING SITUATIONS OF GENERAL PROGRAM IN VARIOUS PROJECT TEAMS IN JILIN PROVINCE DURING 2013-2017

Time (year)	Project Teams (team)	Number of applying programs (item)	Number of funding programs (item)	Funding rate
2013	25	1461	323	22.11%
2014	18	1120	306	27.32%
2015	21	1366	324	23.72%
2016	19	1331	328	24.64%
2017	20	1424	374	26.26%
Average	20	1340	331	24.81%

B. Basic Situations of Youth Science Fund Program

The Young Science Fund Program is an initial venture investment for young scientific and technological talents to carry out the initial research in order to encourage young talents to seek truth and innovation. Young scientific researchers in Jilin Province are always actively involved in applying for such programs, the number of annual application is remaining more than 1300, and the average funding rate is remained at 22.0%. However, the number of the approved funding items and the proportion of funds in the whole country is small, i.e. only about 2% (see Table 2 for details). Therefore, it is necessary to improve the original innovation ability of the scientific researchers and guide the young scientific and technological talents to break through their traditional thought, and the essay should not be taken as the only determining factor, but more and more application technologies and results should be continuously explored through theoretical research.

TABLE II. TABLE FOR CHANGES IN APPLICATION AND FUNDING SITUATIONS OF YOUTH FUND PROGRAM DURING 2013-2017

Difference	Proportion of applying programs	Proportion of applying program in the whole country	Funding rate	Proportion of the approved funding program	Average proportion of approved funding programs in the whole country	Proportion of approved funding capital	Average proportion of approved funding capital in the whole country	Single average funding capital
Jilin Province	6%	About 2.11%	About 23.03%	-9%	About 1.97%	-12.4%	About 2%	-3.6%

C. Basic Situations of Regional Science Fund Program and Key Program

In the past five years, the number of the approved funding programs from the regional science funds and key programs has remained unchanged basically and stable relatively. As China has increased its investment in basic research, the single average funding capital for the key programs has also been increased year by year, for example, the growth rate of the single average funding capital in the whole country is 1%, but Jilin Province has reached 2.8%, which is 1.8% higher than the national average. While a steady growth of the regional science fund and key program has been maintained, a series of problems have also been produced. The average of the approved funding programs from the regional science fund and key program in Jilin Province and the proportion of the funding capitals in the whole country is about 1.5% and 1.6 respectively, accounting for a relatively low proportion in China.

D. Basic situations of National Outstanding Youth Science Fund Program

The National Outstanding Youth Science Fund supports young scholars who have achieved outstanding achievements in basic research, independently selected the research directions and carried out innovation researches, so as to enhance the innovation awareness of the scientific researchers and cultivate a number of outstanding academic leaders who have entered the scientific and technological frontiers in the world. A number of excellent national outstanding youth science fund talents have been emerged in Jilin Province and have performed outstandingly in each science department. In the past five years, the number of programs funded by the National Outstanding Youth Science Fund in Jilin Province has been doubled. According to the division of disciplines, it has ranked 13th in China in terms of funding in fields such as chemistry, life sciences, engineering and materials science, and information science. See Table 3 for details.

TABLE III. TABLE FOR COMPARISON OF FUNDING SITUATIONS AMONG VARIOUS SCIENCE DEPARTMENTS FROM NATIONAL OUTSTANDING YOUTH SCIENCE FOUND PROGRAMS DURING 2013—2017

Amount: Ten thousand yuan

Difference	Rank	Department of Mathematical and Physical Sciences		Department of Chemical Science		Department of Life Sciences		Department of Geoscience	
		Number of programs	Amount	Number of programs	Amount	Number of programs	Amount	Number of programs	Amount
China		24.6	7474	30.4	10020	25.4	8360	21	6930
Jilin	13			2	700	1	350		
Proportion in the whole country				6.67%	6.67%	3.85%	3.85%		
Difference	Rank	Department of Engineering And Materials Science		Department of Information Science		Department of Management Science		Department of Medical Science	
		Number of programs	Amount	Number of programs	Amount	Number of programs	Amount	Number of programs	Amount
China		37.6	12430	27.2	9040	6.8	1561	25	8250
Jilin	13	1.25	375	1	362.5				
Proportion in the whole country		3.34%	3.34%	3.57%	3.57%				

E. Basic Situations of Overseas and Hong Kong-Macao Scholar Cooperative Research Fund Program and Outstanding Youth Science Fund Program

In the past five years, there were a few programs supported by the Overseas and Hong Kong-Macao Scholar Cooperative Research Fund Program and Outstanding Youth Science Fund, the average annual funding program number was only a single digit, the averages were 2 and 8 respectively, and the proportion in the whole country was relatively low. However, the strength demonstrated in the dominant disciplines has remained stable. For example, compared with other disciplines, in the field of chemistry, the funding number and capital from the overseas and Hong Kong-Macao Scholar Cooperative Research Fund Program were maximum (see Table 4 for details).

TABLE IV. TABLE FOR COMPARISON OF FUNDING SITUATIONS AMONG VARIOUS SCIENCE DEPARTMENTS IN JILIN PROVINCE FROM OUTSTANDING YOUTH SCIENCE FOUND PROGRAM DURING 2013—2017

Amount: Ten thousand yuan

Difference	Rank	Department of Mathematical and Physical Sciences		Department of Chemical Science		Department of Life Sciences		Department of Geoscience	
		Number of programs	Amount	Number of programs	Amount	Number of programs	Amount	Number of programs	Amount
China		47	6153.33	57	7410.00	58	7626.67	38	5026.67
Jilin	14	1	130.00	3	390.00			2	260.00
Proportion in the whole country		2.13%	2.13%	5.26%	5.26%			5.13%	5.13%
Difference	Rank	Department of Engineering And Materials Science		Department of Information Science		Department of Management Science		Department of Medical Science	
		Number of programs	Amount	Number of programs	Amount	Number of programs	Amount	Number of programs	Amount
China		73	9533.33	59	7713.33	14	1863.33	51	6630.00
Jilin	14	1	216.67	2	325.00				
Proportion in the whole country		2.27%	2.27%	4.24%	4.24%				

III. EXISTING PROBLEMS

A. Program Number and Program Capital

From the comparison analysis on the data of the National Natural Science Foundation of China during 2013-2017, the number of general program funding applications in Jilin Province and the proportion of the funding applications in the whole country were continuously declined, and the teams who obtained more than 20 million capital for the general program in Jilin Province only included Jilin University, Changchun Institute of Applied Chemistry Chinese Academy of Sciences and Northeast Normal University, among which, the number of the approved funding programs and the capital in Jilin University were only more than 50% of the average number of the approved funding programs and the average capital in the top ten units in the whole country. The growth rate of the number of funding applications from the Youth Science Fund Program in Jilin Province was far lower than the growth rate of the number of funding applications in the whole country, and the number of the approved funding programs and the approved funding capital was not even raised. The gap between the number of the approved funding programs in Jilin Province and the number approved funding programs in the whole country was widened, and the approved funding capital in Jilin Province was decreased significantly. The gap between the growth rate of the number of the approved key programs in Jilin Province and the growth rate of the number of the approved key programs was widened, and the situations for decline in approved funding capital in Jilin Province was severe. The proportion of the approved funding programs from Overseas and Hong Kong-Macao Scholar Cooperative Research Fund Program in Jilin Province was too small in the proportion of the approved funding programs in the whole country. The proportion of the approved funding programs from Outstanding Young Fund Program in Jilin Province was relatively small in the proportion of the approved funding programs in the whole country.

B. Department Program Number and Program Capital

From the analysis on the data comparison of the National Natural Science Foundation of China during 2013-2017, there were relatively few funding programs and capital obtained for the Department of Medical Science and the Department of Management Science in Jilin Province. There were relatively few funding programs and capital obtained for the Department of Medical Science and the Department of Management Science from the Youth Fund Program in Jilin Province. There were relatively few funding programs and capital obtained for the Department of Earth Sciences, the Department of Engineering and Materials Science and the Department of Information Science from the Regional Fund Program in Jilin Province. There were relatively few funding programs and capital obtained for the Department of Medical Science and the Department of Management Science from the Key Program in Jilin Province. There was no funding obtained for the Department of Geosciences, the Department of Medical Science and the Department of Management Science from the National Outstanding Youth Science Fund Program in Jilin Province. There was no funding obtained for the Department of Mathematical and Physical Sciences, the Department of Life Science, the Department of Information Science and the Department of Management Science from the Overseas and Hong Kong-Macao Scholar Cooperative Research Fund Program in Jilin Province. There was no funding obtained for the Department of Life Science, the Department of Management Science, and the Department of Medical Science from the Outstanding Youth Science Fund Program in Jilin Province.

C. Number of Application Units and Funding Number

From the analysis on the data comparison of the National Natural Science Foundation of China during 2013-2017, the number of the general program funding application teams and the number of the applying programs in Jilin Province were continuously declined, and the number of the funding programs was grown slowly. The number of the applying teams for Youth Science Fund Program in Jilin Province and the number of the funding programs were continuously declined.

IV. COUNTERMEASURES AND SUGGESTIONS

The overall situation of the programs obtaining the support of the National Natural Science Foundation of China in Jilin Province is not optimistic, the number of the approved funding programs is decreased, and the approved funding capital is reduced, and the teams obtaining more than 20 million yuan capital are relatively solidified, the number of the fund applying units is grown slowly, the ability to undertake major programs is weakened, the foreign communication and cooperation is insufficient, the training strength of young research talents is insufficient, the development of disciplines is unbalanced, some individual disciplines have never even applied for any fund. In the face of these complicated situations, we must face and overcome the difficulties and comprehensively strengthen the work of the basic research.

Formulate various supporting policies for strengthening the basic research work. It is not only necessary to treat universities, enterprises and research institutes equally, but also to formulate the corresponding policies based on the policy implementing . There must be not only guidance, in terms of finance, taxation, talent introduction, preparation and treatment, scientific equipment and equipment procurement, but also a series of specific standards.

Continuously stabilize the fund investment in the basic research work. Guide and encourage the social capital investment while increasing the government financial fund investment, strictly implement the Several Opinions of the CPC Central Committee on Further Perfecting the Financial Fund Investment Program Fund Management and Other Policies [2] and further innovate the use and management mode of the scientific research funds in order to ensure the orderly development of the basic research.

Accelerate and deepen the reform of the title system. Reform and innovate the evaluation mode, break through the restrictive conditions such as education background, qualification, thesis, research topics, explore and establish an evaluation system that meets the work characteristics for researchers who have been engaged in basic research and cutting-edge technological breakthroughs for a long term, and further break through the title channel, so as to make the

researchers engaging in basic research benefit greatly without suffering losses.

Continuously strengthen the basic research talent team. Adhere to free exploration and demand orientation, call universities and research institutes to actively apply for programs, build research foundations and strengthen cooperation and exchanges with foreign countries, promote the balanced development and the characteristic development of all disciplines in the context of "world-class universities and world-class disciplines", strengthen the introduction and cultivation of the young, middle-aged and reserve scientific and technological talents, and create a high-level innovative talent team [3].

Put great efforts to create a good basic research soft environment. Pay attention to the establishment of a scientific research integrity system. It is not only necessary to severely crack down on research fraud and establish a "black list", and but also to widely publicize the importance of basic research and guide the public's understanding and tolerance of basic research personnel so that the basic researchers can devote themselves to the work.

Integrate existing resources and build a regional sharing platform

Strengthen the local top-level design, encourage the enterprises, universities and research institutes to cooperate deeply in establishing the innovative technology strategic alliance, make full use of available resources, achieve multi-discipline integration, and achieve the goal positioning of the same advanced laboratories both at home and abroad. Put focus on the outstanding experts from universities, research institutes and enterprises, distinguish the scientific research fields, establish an integrated collaborative innovation team, aim at the latest development of the basic research at home and abroad, and research and develop the original major achievements of promotional value [4] combining with the national development strategies.

Deepen the reform and innovation of scientific research management and build a vigorous new system and new mechanism for the basic research

In light of the flaws and deficiencies in the program organization and implementation management, put focus on accelerating the perfection of the new system and new mechanism for the basic research based on the contents in implementation opinions of Jilin Province on deepening the system and mechanism reform and implementing the innovation-driven development strategy. Firstly, it is necessary to further perfect the evaluation system of the science and technology programs, scientifically formulate the program budget performance targets that are targeted, clear, specific, fine, reasonable and feasible, and explore and establish the technological innovation, quality and contribution-oriented performance evaluation system. Secondly, it is necessary to create an orderly and efficient benign competitive environment for the scientific research [5].

V. CONCLUSION

The application of National Natural Science Fund reflects the level of scientific research and teaching in colleges, scientific research institutes and enterprises. We use the data from the National Natural Science Foundation of China to analyze the application of the National Natural Science Fund of Jilin province between 2013 and 2017, and we can draw the following conclusions from these analyses. Since the number of introduction talent has increased in recent years, the number of people applying for and obtaining the National Natural Science Fund is increasing year by year, especially for the application of Youth Fund. The acquisition of these funds makes the young teachers have the conditions to carry out scientific research, and is also great help to its corresponding teaching. It has greatly promoted the level of basic research in our province, and has played an important role in promoting the development of economy and society by science and technology.

REFERENCES

[1] Zhong Yongheng, Xing Xia, Liu Jia and Wang Hui, An Analysis on Provincial Basic Research Competitiveness in China During 2006-2016 [G]. Science and Technology Management Research (2017) 24-0001-01-11.

[2] Several Opinions of the CPC Central Committee on Further Perfecting the Financial Fund Investment Program Fund Management and Other Policies (ZBF [2016] No. 50).

[3] Several Opinions of the State Council on Comprehensively Strengthening the Basic Scientific Research (GF [2018] No. 4).

[4] Lv Xueyi and Zheng Shaoyu, Countermeasures and Suggestions for Strengthening the Basic Research, Decision-Making & Consultancy, 2017 (3).

[5] Wang Shenghao and Shao Lizhou, Several Problems in the Financial Support for the Funding Management of Basic Science and Technology Research and their Countermeasures and Suggestions, Commercial Accounting, 2017 (3).