

A Comparative Study on the Seven Main Types of Programs Approved by National Natural Science Foundation of China in 2017

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Abstract—This paper uses annual statistical data from National Natural Science Foundation of China, analysis seven main types of programs approved in 2017. First of all, this article introduces the basic information of the National Natural Science Foundation of China, and then introduces the differences of the seven main types of programs. Secondly, the total number and proportion of the seven types of programs are analyzed based on the number of programs and the amount of funding. In addition, the average funding of each type of program is further calculated and compared. The result shows that, in 2017, the General Program has the largest proportion of both total number of programs and total amount of funding; the Young Scientists Fund has a large number of amount, but the average funding is the lowest; the average funding of Key Program, National Science Fund for Distinguished Young Scholars, and Excellent Young Scientists Fund are extremely high, however, the number of these three types of programs are too few. Funding of International (Regional) Cooperation and Exchange Program, and Fund for Less Developed Regions should be further enhanced.

Keywords—National Natural Science Fund, General Program, Young Scientists Fund, amount of funding, comparison

I. INTRODUCTION

The National Natural Science Foundation of China (NSFC) was founded in 1986. For more than 30 years, Natural Science Foundation has consistently supported basic scientific research of China, and gradually formed more than 10 types of programs, including General Program, Key Program, Major Program, Major Research Plan, Young Scientists Fund, Fund for Less Developed Regions, Excellent Young Scientists Fund, National Science Fund for Distinguished Young Scholars, Science Fund for Creative Research Groups, Joint Research Fund for Overseas Chinese Scholars and Scholars in Hong Kong and Macao, International (Regional) Cooperation and Exchange Programs, Programs of Joint Funds, Tianyuan Fund for Mathematics, and Special Fund for Research on National Major Research Instruments [1]. Each type of programs has different focuses, belonging to exploration programs, talent programs, instrument programs, or fusion programs.

Many scholars have considered the role of the National Natural Science Foundation of China in improving science and technology capabilities in China from different aspects. Most of these research results are submitted in Chinese, with very few English papers. The National Natural Science Foundation of China publishes annual statistics on the amount of funding received by each university [2]. Some scholars have evaluated the performance of universities in specific disciplines [3-6]. Some scholars have studied the relationship between National Natural Science Foundation funding and research output [7-8]. Some scholars have considered the benefits of the National Natural Science Gold to the growth of young scholars [9]. Some scholars have presented suggestions for the improvement of the National Natural Science Foundation [10]. Sun Yutao of Dalian University of Technology has published a paper in *Science*, the world's top journal, and suggested that the efficiency of the use of scientific research funds should need to be further improved through institutional reform and statistical improvement [11].

This paper is a more macroscopic comparison, focus on seven main types of programs, including the General Program, Key Program, Young Scientists Fund, Fund for Less Developed Regions, Excellent Young Scientists Fund, National Science Fund for Distinguished Young Scholars, International (Regional) Cooperation and Exchange Program, the main reason for choosing these seven program is that they are the main components of the whole NFSC system, and the statistics of other types of programs are not included in the annual statistics. This paper reorganized the statistical data from National Natural Science Foundation of China in 2017, analyzes the proportion of the seven types of programs was analyzed based on the total amount of programs and the total amount of funding, the average amount of funding for each program was calculated and compared.

II. THE INTRODCUTION OF SEVEN TYPES OF PROGRAMS OF NSFC

According to the guide of National Natural Science Fund 2018, the seven types of programs have unique purpose and funding criteria [1], the introduction of seven types of programs is listed in Table 1. It can be found that Key Program, General Program, Young Scientists Fund and Fund for Less Developed Regions are belong to exploration programs, and the funding can be used by a team. National Science Fund for Distinguished Young Scholars and Excellent Young Scientists Fund are belong to talent programs, and the funding can be only used by one scientist. International (Regional) Cooperation & Exchange

Program is belong to fusion program.

Which has to be explained is that, in the Fund for Less Developed Regions, the less developed regions including 11 whole provinces and several minority autonomous prefectures and special support cities in other 5 provinces. The 11 whole provinces are Inner Mongolia, Ningxia, Qinghai, Xinjiang, Xizang, Guangxi, Hainan, Guizhou, Jiangxi, Yunnan and Gansu, the minority autonomous prefectures are Yanbian of Jilin, Enshi of Hubei, Xiangxi of Hunan, Liangshan of Sichuan, Ganzi of Sichuan, Aba of Sichuan, Yan'an of Shaanxi and Yulin of Shaanxi. Researchers who do not work in these areas cannot apply this type of funding.

TABLE I. THE INTRODUCTION OF SEVEN TYPES OF PROGRAMS

Programs	Keywords	A Brief Introduction
General Program	General	General Program supports scientists to do basic research on bottom-up based topics within the funding scope of NSFC to conduct innovative research and promote a balanced, coordinated and sustained development of all disciplines.
Key Program	Key	The Key Program supports researchers to conduct in-depth, systematic and innovative research in directions with sound research basis or where new growth points of scientific disciplines might emerge, so as to promote disciplinary development and breakthroughs in some important areas or scientific frontiers.
Young Scientists Fund	Young	The Young Scientists Fund supports young scientists to freely choose their research topics within the funding scope of NSFC to conduct basic research, fosters the ability of young scientists to independently undertake research projects and do creative research, stimulates creative thinking of young scientists and trains backup talents for basic research.
Fund for Less Developed Regions	Less-Developed	The Fund for Less Developed Regions supports scientists in specified regions of China to conduct creative research within the funding scope of NSFC, so as to foster and support researchers in these regions, to stabilize and gather outstanding talents to facilitate the construction of the regional innovation system as well as the social and economic development of the regions.
Excellent Young Scientists Fund	Excellent	The Excellent Young Scientists Fund supports young scholars with good achievements in basic research to conduct innovative research in areas of their own choice, so as to promote fast growth of creative young talents and foster a number of outstanding talents on the international science frontiers.
National Science Fund for Distinguished Young Scholars	Distinguished	The National Science Fund for Distinguished Young Scholars supports young scholars who have made outstanding achievements in basic research to select their own research directions and conduct creative research, so as to speed up the growth of young scientific talents, attract overseas talents and foster a group of prominent academic pacemakers in the forefront of international science and technology.
International (Regional) Cooperation and Exchange Program	International	In order to improve the quality of China's scientific research and its international competitiveness, the International (Regional) Cooperation and Exchange Programs aim at funding Chinese scientists to conduct substantial cooperation with their international collaborators in focused frontier research areas and take full advantage of international scientific and technological resources on the basis of "equal cooperation, mutual benefits, and equal sharing of research results".

Source: National Natural Science Foundation of China, National Natural Science Fund Guide to Programs 2018, China Science Publishing & Media LTD, 2018.

III. OVERALL COMPARISON OF THE NUMBER OF APPROVED PROGRAMS AND THE AMOUNT OF FUNDING

A. The Total Number of Programs Approved in 2017

In 2017, NSFC had totally Approved 40081 programs for these seven types of programs; the bar chart of the number of approved programs is shown in Figure 1. The number of General Program and Young Scientists Fund is both very large, all over 17000, Less-developed is about 3000, while other types of programs are very few, and all bellow 700.

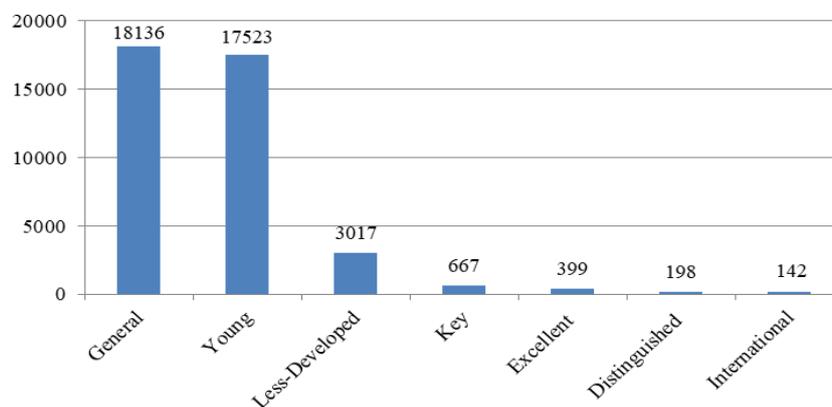


Fig. 1. The total number of seven types of programs approved in 2017

B. The Total Amount of Funding in 2017

The total funding amount of these 40081 programs is 19.03 billion Yuan, the bar chart of total amount of funding is shown in Figure 2. It can be found that the General Program has the largest amount of total funding, which is over 10 billion Yuan, and followed by Young Scientists Fund, Key Program, Fund for Less Developed Regions, Excellent Young Scientists Fund, and National Science Fund for Distinguished Young Scholars, and the total funding of International (Regional) Cooperation & Exchange Program is the minimum.

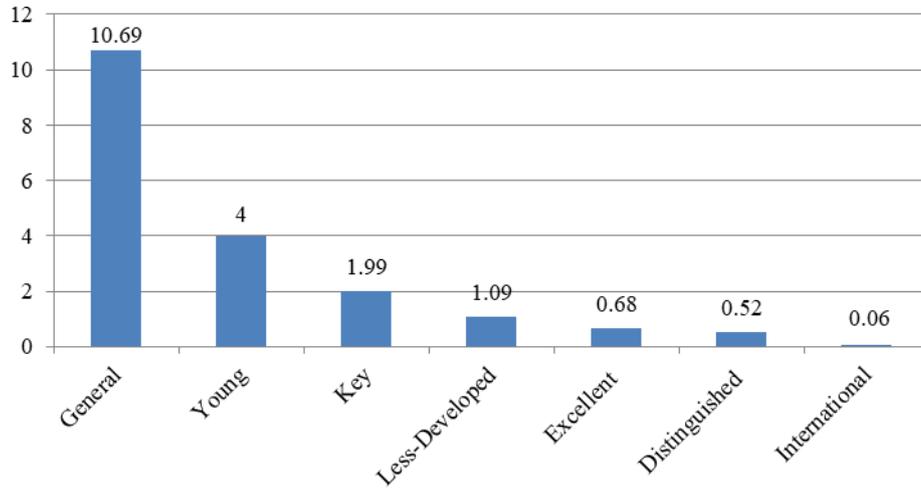


Fig. 2. The total amount of funding of seven types of programs in 2017 (Billion Yuan)

IV. THE PROPORTION COMPARISON OF THE NUMBER OF APPROVED PROGRAMS AND THE AMOUNT OF FUNDING

A. The Proportion of the Total Number of Programs Approved in 2017

The proportion of each type of programs can be derived according to the total number of approved programs. The proportion of the number of approved programs is shown in Figure 3. It can be found that the proportion of General Program and Young Scientists Fund is both over 40%, totally account 88.97%. The proportion of other types of programs all less than 10%. The proportion of International (Regional) Cooperation & Exchange Program is only 0.35%.

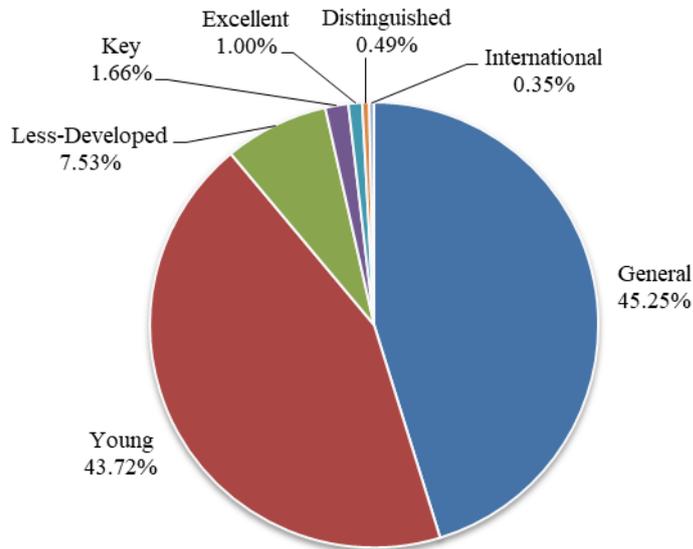


Fig. 3. The proportion of total number of seven types of programs approved in 2017

B. The Proportion of the Total Amount of Funding in 2017

Based on the total amount funded, the proportion of the seven types of programs in 2017 is shown in Figure 4. The General Programs has the largest proportion, more than half of the total, and followed by Young Scientists Fund, Key Program, Fund for Less Developed Regions, Excellent Young Scientists Fund, and National Science Fund for Distinguished Young Scholars, and the total funding of International (Regional) Cooperation and Exchange Program is the minimum. Compared with the

proportion of total number of programs approved, the order of various programs has not changed, but the proportion has changed greatly, the main reason is that there is a large gap in funding for various programs.

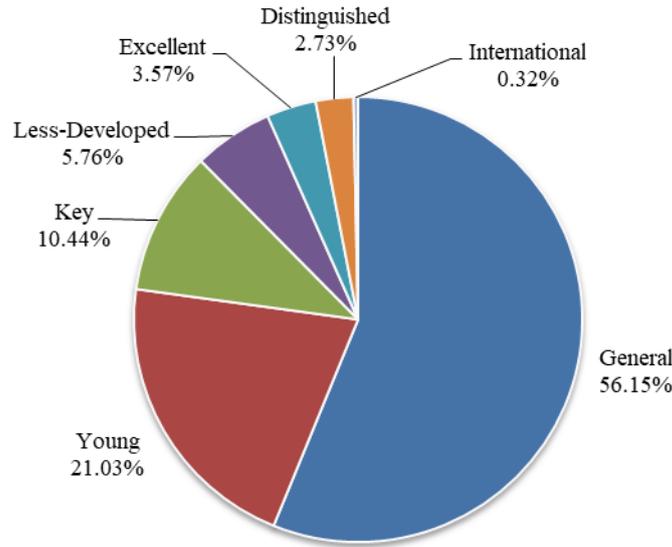


Fig. 4. The the proportion amount of funding of seven types of programs in 2017

V. THE COMPARISON OF THE AVERAGE FUNDING OF PROGRAM

Based on the total amount of funding and the number of programs approved, the average amount of funding per program of each type of program can be calculated. The bar chart of the average amount of funding per program is shown in Figure 5. It can be noted that, the average funding of National Science Fund for Distinguished Young Scholars is the highest, nearly 3.5 million Yuan, and the funding can be only used by one scientist. The average funding of Key Program is nearly 3 million Yuan, and the funding can be used by a team. The average funding of Excellent Young Scientists Fund is 1.3 million Yuan, the funding can be utilized only by one young scholar. The average funding or other types of programs is less, and the lowest is the Young Scientists Fund, but it is still enough for one research program.

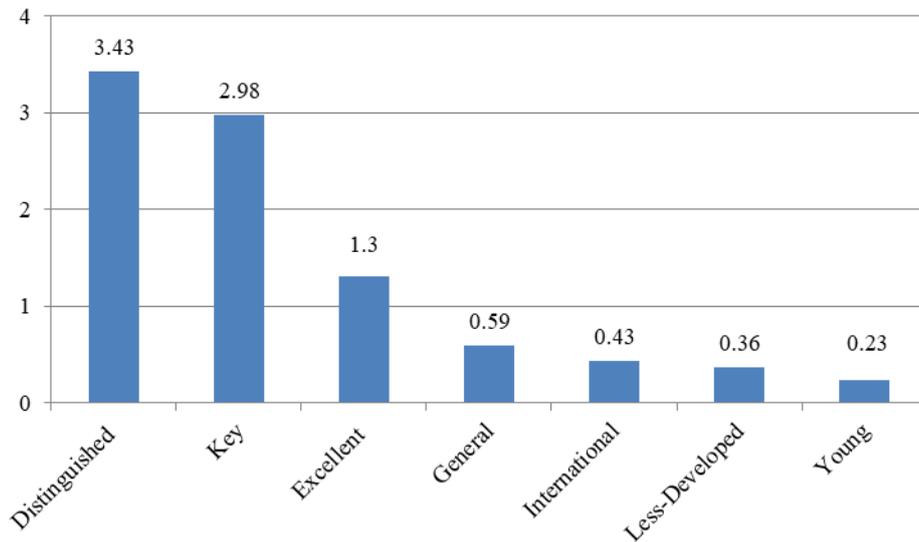


Fig. 5. The average amount of funding per program of NSFC in 2017 (Million Yuan)

VI. CONCLUSION AND SUGGESTION

In 2017, NSFC had approved 40081 programs in seven types of programs. The number of General Program and Young Scientists Fund are both very large, all over 17000, Less-developed is about 3000, while other types of programs are very few, and all below 700. The proportion of General Program and Young Scientists Fund is both over 40%, totally account 88.97%. The proportion of other types of programs all less than 10%. The proportion of International (Regional) Cooperation & Exchange Program is only 0.35%.

The total amount of funding from NSFC is 19.03 billion Yuan. The General Program has the largest amount of total funding, which is over 10 billion Yuan, and followed by Young Scientists Fund, Key Program, Fund for Less Developed Regions, Excellent Young Scientists Fund, and National Science Fund for Distinguished Young Scholars, and the total funding of International (Regional) Cooperation and Exchange Program is the minimum. The General Programs has the largest proportion, more than half of the total, and followed by Young Scientists Fund, Key Program, Fund for Less Developed Regions, Excellent Young Scientists Fund, and National Science Fund for Distinguished Young Scholars, and the total funding of International (Regional) Cooperation and Exchange Program is the minimum.

The average funding of National Science Fund for Distinguished Young Scholars is the highest, nearly 3.5 million Yuan, and the funding can be only used by one scientist. The average funding of Key Program is nearly 3 million Yuan, and the funding can be used by a team. The average funding of Excellent Young Scientists Fund is 1.3 million Yuan, the funding can be utilized only by one young scholar. The average funding or other types of programs is less, but it is enough for one research program.

According to the Statistical Yearbook of China, the number of teachers in universities and colleges in China was 2.4 million, while one NSFC program usually takes 3 years to research. We can take a rough estimate, although the number of approved projects seems to be numerous. Nevertheless, on average, only 1 of the 20 university teachers have the chance to get the NSFC program. Since some exceptional teachers will continue to get several NSFC programs, the probability of a teacher to get a NSFC program is actually less than 5%. On the other hand, the funding for some program is very large, so that the program leader needs to spend thousands of Yuan every day.

Therefore, NSFC should further optimize the funding system. First, the scope of funding for various programs should be gradually expanded, and more teachers should be given the opportunity to obtain NSFC programs, even if the NSFC only supports less than 100,000 Yuan, it can get some decent results. Secondly, the amount of funding for the National Science Fund for Distinguished Young Scholars and the Excellent Young Scientists Fund should be reduced, for a single person, these funds are too much, and more people should be granted this opportunity. Third, more emphasis should be placed on the research process evaluation and final result evaluation, if outstanding results are obtained, NSFC should provide additional funds. Finally, funding of International (Regional) Cooperation & Exchange Program, and Fund for Less Developed Regions should be further enhanced, to promote communication and cooperation among researchers from different countries.

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