An Analysis of Science Communication Policy in European Union Framework Programme

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Abstract--**Many science and technology developed countries take the science and technology communication as an important component of research projects. European Union has made important efforts to study and develop the science-society interface and to improve communication between scientists and the European citizens in order to assure that public awareness keeps pace with rapid scientific and technological development. There are two ways for improving the science communication in European Union's Framework Programmes. The first way is setting an independent science communication section, and the second way is integrating science communication content into research projects. The aim of this paper is to analyze the Framework Programmes' science communication policies and give some suggestions to science and technology policy decision makers in China.**

I. INTRODUCTION

Framework programmes (FPs for short) have been the main financial tools through which the European Union (EU for short) supports research and development activities covering almost all scientific disciplines [8]. FPs have been implemented since 1984 and cover a period of five years with the last year of one FP and the first year of the following FP overlapping. The current FP is FP7, which runs up to the end of 2013. Table1 shows the FPs and their budgets. It is designed to build on the achievements of its predecessor towards the creation of the European Research Area, and carry it further towards the development of the knowledge economy and society in Europe. FPs have been carried out nearly 30 years, which play important role in economic and social development of European Union [15].

TABLE 1 FPS AND THEIR BUDGETS

FP	period	budget（in EUR million）
FP1	1984-1987	3750
FP2	1987-1990	5396
FP3	1990-1994	6600
FP4	1994-1998	12300
FP5	1998-2002	14900
FP6	2002-2006	17500
FP7	2007 -2013	53000

FPs attach great importance to science communication, through which EU hope to promote public understanding of science research. As both science and science communication have become increasingly globalized, Europe's role in research has become increasingly visible outside Europe as well as within it [2]. In addition, the EU has made important efforts to study and develop the science-society interface and to improve communication between scientists and the European citizens in order to assure that public awareness keeps pace with rapid scientific and technological development [2].

Although China had made lots of efforts for promoting Chinese scientists to do science communication, so far this has not significantly materialized. So, in China, there are many papers discussed on how to do science communication or case studies about other countries' science communication policies [14][15][16][17][19][20][21]. On the basis of literature review, we found that until now there is little paper discussed FPs' science communication policies. We all know that FPs is one of the biggest official comprehensive research and development projects, and China still is a developing country. Although China and the EU have different conditions in science and technology policy, analysis of FPs' science communication policies can still provide some suggestions for a developing China.

The aim of this paper is to analyze the FPs' science communication policies and give some suggestions to science and technology policy decision makers in China. The research questions are:

1. What the ways of improving science communication in EU' PFs?
2. What promoted EU making the decision of improving communication between scientists and the European citizens?
3. Why the policies of science communication in FPs succeed?
4. What are the effects of science communication policy in FPs?
5. Why the lessons from FPs are suitable for China?
6. What lessons that the science and technology sector of China can get from FPs' science communication policy?

II. ANALYSIS OF SCIENCE COMMUNICATION IN FPS

There are two ways for improving the science communication in European Union's Framework Programmes. The first way is setting an independent science communication section, and the second way is integrating science communication content into research projects.

A. the independent science communication section

FP6 set a new general domain called "science and society" in 2001. It covers 38 actions, dealing around three goals: to promote scientific education and culture; to bring science policy closer to the citizens; to put responsible science at the heart of policy making [11]. The total funding for the Science and Society programme in FP6 was EUR88 million [10]. In a nutshell, we can say that the Science and Society Action Plan

is a strategy towards enhancing synergy between scientists, citizens and politicians.

However, science and society activities are not new. In FP5 (within the programme "improving human potential"), they already dealt with activities such as gender issues and raising public awareness, including prizes and science week networking [12]. Furthermore, about 100 projects across the Fifth Framework Programme were dealt with for an ethical review.

In FP7, they set a lager science communication section in Research Capacities which named science in society. 'Science in Society' aims to bridge the gap between science professionals and those without a formal science education and to promote a taste for scientific culture in the public at large. Some of the initiatives, therefore, are aimed at triggering the curiosity of young people for science and at reinforcing science education at all levels [8]. The indicative budget allocated to the structuring activity science in society for the duration of FP7 is EUR 280million [8].

B. science communication embedded in all research projects

Besides setting an independent section, FPs have another way of promoting public understanding of science which is embedding science communication in research projects. Anyone who wants to apply for FPs research projects especially FP7 research projects; they should carry out science communication activities in their research projects.

In the EU's framework programmes, dissemination of research results is a contractual obligation for participation in research initiatives. Communicating research results with public is one of the conditions for applying for FPs' projects. FPs also require that researchers must: engage, whenever appropriate, with actors beyond the research community and with the public in order to foster dialogue and debate on the research agenda, on research results and on related scientific issues with policy makers and civil society; create synergies with education at all levels and conduct activities promoting the socioeconomic impact of the research [13]. The "participation rules" lay down not only the rules for participation in FPs but also the rules for dissemination of research results. FPs also require: the consortium shall submit a final report to the Commission within 60 days after the end of the project. The report shall comprise a report covering the wider societal implications of the project, including gender equality actions, ethical issues, efforts to involve other actors and spread awareness as well as the plan for the use and dissemination of foregrounds [9].

FPs have higher requirements on social impacts of research results. FPs require consortium should carry out special activity for dissemination. CORDIS (which is short for community research and development information service) is the European Commission's primary public repository and portal to disseminate information on all EU-funded research projects and their results in the broadest sense [3]. Through CORDIS, EU provides the services to foster the dissemination of knowledge in a user-friendly way and the exploitation of research results, initiatives to foster dialogue and debate on scientific issues and research results with a broader public beyond the research community, including civil society organization.

III. THE BACKGROUND AND EFFECTS ANALYSIS OF SCIENCE COMMUNICATION IN FPS

A. what promoted EU making the decision of improving communication between scientists and the European citizens?

80 % of Europeans believe that science will one day overcome diseases such as AIDS or cancer, but also that almost half of Europeans are both uninformed and uninterested in science. Citizens do not always trust science and scientists. On top, it was found out in a survey that young people do not find scientific studies and careers very attractive [11]. Based on these survey findings, science and society action plan was adopted by EU commission in 2001, which marked EU had engaged in promoting and encouraging the conversation between science and society. The FP6 contracts contain a binding clause that requires researchers to disseminate the results of their community-funded research to the public. It is hoped that the inclusion of this condition will help to stimulate the public's debate on science and draw wider attention to such issues as scientific culture, ethics, governance and women in science. Through this plan, EU wants to cultivate the culture of science communication in research community, to bring science closer to public, and to promote public understanding of science [11].

B. why the policy of science communication in FPs succeed?

Integrating science communication and science research policy was not only welcomed by Europeans but also supported by scientists.

Firstly, European citizens want to know more science and technology information and science research. From the euro barometer public opinion survey which has been carried out since 2005, we can see that 78% of European citizens are very interested or interested in new science inventions [4]. Most of citizens, no matter well know technology or don't understand technology at all, agreed that it is very important to participate in establishment of science and technology policy According to the results of euro barometer public opinion survey which has been carried out since 2010, European citizens appear to have a clear and positive view about the image of science and technology [5].

Secondly, EU is active in science communication activities. EU provides financial supports to beneficiaries of FPs' funding. For example, researchers can get financial supports from FPs for setting up a website for publishing research progress of their projects regularly. On the other hand, EU also offers targeted assistance to projects and consortia to provide them with access to the necessary skills to optimize the use of results [6].

Thirdly, EU commission hopes that through integrating

science research and science communication in FPs, those beneficiaries of FPs' funding can realize that they are responsible for science communication [6]. And these researchers are capable to improve images of science and scientists in public through more science communication activities. More and more scientists learned that knowing more research results of their projects can help public understand the development of science and technology. Therefore, scientists are more and more active in carrying out science communication activities.

C. what is the effects of science communication policy in FPs?

EU commission has assessed the science and society action plan of FP6. The report of mid-term assessment of science and society activities 2002-2006 [6] showed: at European level, "Science and Society" is a new initiative that was undertaken under Sixth Framework Programme. Its main objectives were formulated in the Science and Society Action Plan, which led to a broad range of activities numbering about 150 projects, conferences and forums The programme has established a forum and a context at European level for examinining Science and Society issues in a manner that provides reflective activities on specific issues related to scientific and technological research. The programme has made important contributions in enlarging the circle of communities involved in such kind of activities at national level (with the biggest impact made in new EU Member States) and has provided increased visibility for these activities both among scientists and among the public. The projects have generally succeeded in creating networks of partners who have been able to achieve common goals, to exchange and share experiences and to demonstrate an European added value by contributing to the emergence of communities in Europe that are seeking to address issues related to the complex roles of science in society; this must be considered as being the main impact of the programme.

Good results have been archived by internet in dissemination of research results and improving the public knows more science and technology information. CORDIS, is run separately and is designed primarily for current and potential participants in the Framework Programmes. In addition to being the official source of information on FP7, CORDIS is intended to enhance exploitation of research results and to promote the dissemination of knowledge. The Second FP7 Monitoring Report[7] showed that The European Commission Research web site on EUROPA currently has some 26.000 pages (in 2008) as well as that are regularly visited by over 125.000 people each month. EUROPA provides up-to date information on the latest decisions and latest advances in European Research. In 2008, there were nearly 8.5 million visits to this site leading to 16.2 million page views.

IV. LESSONS FOR CHINA

In recent years, China has got some scientific and technological achievements though the high-tech research and development programs and the basic research programs, with 977thousands patents and 472 thousands papers in 2009. According to the data from SCI, EI and ISTP, Chinese academics published 271 thousands paper in international journals and proceedings of international conferences in 2008, ranking second in the world [1]. From these data we can see that China has plenty of science and technology resources for public to utilize.

The China Association for Science and Technology published a newly Chinese Public Scientific Literacy Survey in 2010, covering 31 provinces, autonomous regions, and municipalities as well as Xinjiang Production and Construction Corps in China's mainland with 68,416 valid responses. According to the newly results, 71.6% of people in China are very or moderately interested in scientific discoveries and technological developments; 71% of Chinese citizens agree that scientist should put efforts into informing public about new developments in science and technology; 77% of Chinese public agree that the government should support basic scientific research, although these research do not make profits right now [18]. From these data we can see that Chinese public has strong demands on knowing information about scientific discoveries and basic scientific research, which bear a close parallel to EU citizens. Therefore, in China, integrating science communication and basic scientific research is very necessary and meaningful.

A. set up an independent science communication program in major projects for science and technology development

<Opinions on strengthen state science popularization capacity>[21] says that national major engineering projects, science and technology plan and major science and technology projects should establish and improve an information releasing mechanism in the process of implementing research projects. However, requirements of this document about informing public about new developments in science and technology are too general to implement specifically. Therefore, we suggest National Natural Science Foundation of China and Ministry of science and technology of China should set up an independent science communication program in national major science and technology projects as soon as possible.

B. science communication embedded in all research projects

We know that it is hard for the public to understand the scientific research results without professionals explain especially in such a science and technology rapid development age. So it is very helpful for promoting the public to understand newly science and technology information if researchers can carry on some science communication activities. A survey about science communication embedded in major science research projects

shows that 96.7% of researchers agree that major science research projects should include science communication undertakings [16]. From this data we can see that researchers would like to do some science communication jobs. About this point, we have some suggestions:

(1) Type of Projects: the government can require unclassified projects released some research results regularly. According to the degree of secrecy of the research contents, the projects can release some results or all results.

(2) Scale of Projects: a survey results shows that 26.5% of researchers agree that the projects whose budgets are over 2 million RMB should include science communication budget. About the proportion of science communication budget, most researchers advise that it is appropriate that 0.5%~1% of projects' budgets is used for science communication [16]. In practice, it can be required according to the scale of projects. The larger the project is in scale, the larger proportion of science communication budget has.

(3) Training: although the researchers have a lot of professional knowledge in their subjects, most of them are in need of science communication skills. Hence, it is necessary to give some training for researchers on how to communicate some professional knowledge with the public. The projects administrating departments such as Ministry of science and technology of China can provide and organize such training for researchers.

(4) Evaluation: On the premise of Intellectual Property Protection, the undertakers of projects were obliged to publish and disseminate information about research results regularly, which is also an index for evaluating the projects [19]. We suggest that the government can require the projects researchers should submit a report about science communication activities related their research. The report should contain dissemination of research results and the effects of public science popularization activities carried out during the process of doing research. Qualitative can be the primary evaluation method; while quantitative can be the secondary evaluation method.

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