

# STUDY ON EVALUATION OF INTERNATIONAL SCIENCE AND TECHNOLOGY COOPERATION PROJECT (ISTCP) IN CHINA

SU CHENG, GUO HONG, MA ZHENG, YU ZHENGLU, PAN YUNTAO

Institute of Scientific and Technical Information of China (ISTIC)  
No.15 Fuxing Road, Beijing 100038, the People's Republic of China

## *Abstract*

This paper presents an overview of evaluation of ISTCP in China. We discuss briefly the history of evaluation and the strengths and weaknesses of different assessment systems. On this basis, with Analytical Hierarchy Process (AHP), we establish evaluation indicator system for ISTCP that includes research project establishment evaluation, mid-period evaluation system, effect evaluation system, and confirm the value of each indicator. At the same time, we established expert database, project database, research organization database, researcher database etc. We therefore establish an evaluation platform for international science and technology cooperation project. We use it to realize full process supervision from evaluation expert selection to project management.

## *1. Survey on Evaluation of ISTCP in China*

Today, the economic globalization, R&D internationalization and technology and economy unification have converged to irreversible trend, which is even broadened and deepened by China's entry to WTO.

Abrupt increase of ISTCP in China is demanding more efficiently scientific and standardized management, of which the scientific evaluation towards the standardization of projects is an important part.

ISTCP backed by foreign government are evaluated according to different supporting countries, following their procedures and measures. Recent years many organizations start to make deliberation process and measures for themselves, and with best of their knowledge work out standardized project selection basis. There are also organizations or institutions stipulated some ordinances and rules to comprehensively and scientifically manage the project establishment appraisal and execution verification.

Following is the introduction of ISTCP evaluation methods adopted by Chinese Academy of Sciences (CAS) □ Academy of Science & Technology of Ministry of Aeronaut & Astronaut (ASTMAA) □ China State Shipbuilding Corporation (CSSC) □ Yun Nan Science & Technology Commission (YNSTC)

### *1.1. CAS*

ISTCP management of CAS includes project macro management, project organization and selection, project tracking management and evaluation and establishment of project management database, etc.

On project establishment appraisal, it stipulates the principles of project establishment, appraisal regulations, appraising items, appraising procedures, appraising standards, appraising personnel selecting conditions and so on. It also builds appraising expert teams according to such main subjects as mathematics, physics, chemistry, biology, technology and geosciences. These teams “discuss among collectivity while grade individually”.

On project tracking management and evaluation, it takes part in middle and long term planning and study of the important projects, putting forward cooperation suggestions according to the characters of the projects, and providing necessary information and allowance. It takes part in mid-term evaluation and progress evaluation until getting the final achievements.

### *1.2. ASTMAA*

ASTMAA in practice has formed effective project management ways. It masters chains like careful topic selection, plan carrying out, and periodical evaluation and so on. It has built stably consisted international cooperation topic appraisal committee and reviews the execution of the cooperative projects last year. It is improving the cooperation level continually.

### *1.3. CSSC*

CSSC emphasizes the core of cooperation and communication. It strictly checks the project from establishment and supervises the whole process. The projects are appraised timely and the headquarter holds intercommunication conference every 2~3 years.

### *1.4. YNSTC*

YNSTC has founded "ISTCP plan" and worked out “YNSTC ISTCP Allowance Management Guideline”, stipulating managing regulations on allowance application, project appraisal, contract, funds allocation, checking, achievement appraisal, achievement publication and so on. It invites Chinese and foreign experts and entrepreneurs to take part in achievement appraisal. For projects with trading potential, it uses the market compatibility after their being put into the market as an important basis to appraise them.

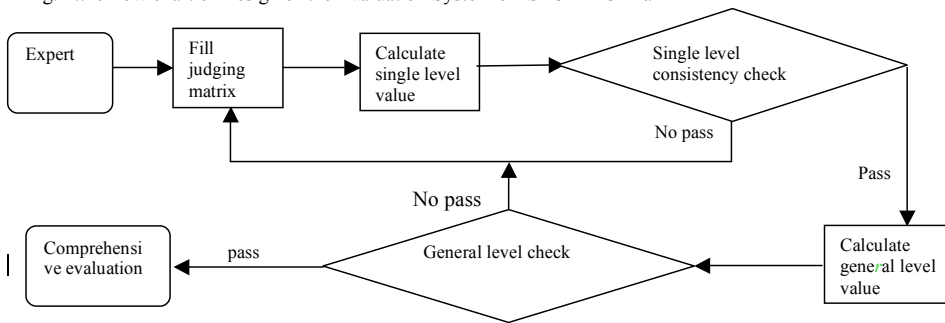
In total in China there has not formed unified and standardized project management and is still lacking in scientific appraising methods. Problems often seen are: although most organizations have their procedure and methods to appraise the establishment of ISTCP, there are no rules or regulations, and no standardization of operation. Some organizations have certain randomness in establishing a project, and have no specific requirement or methods for evaluation.

## *2. Evaluation System of ISTCP in China*

### *2.1. Design of the Evaluation System of ISTCP in China*

We adopt AHP method, breaking down the evaluation of ISTCP to a sequential and terraced structural model. There are 3 levels in this model. They are Based on large scale questionnaires, we held several expert proseminars. With Delphi method, we decided the object level, guide line level and indicator level of ISTCP evaluation system. When evaluation indicator system was initially decided, we invited experts to grade different indicators with level analyzing method combined with Delphi method. The value of each indicator is calculated by Expert Choice software with following flow chart.

Fig. 1:the flow chart of Design of the Evaluation System of ISTCP in China



## 2.2. China ISTCP Evaluation System and the Evaluation Standards

China ISTCP evaluation system consists 3 parts: ISTCP project establishment evaluation system, ISTCP mid-term evaluation system and ISTCP effect evaluation system.

### 2.2.1 ISTCP Research Project Establishment Evaluation Comprehensive Indicator System

ISTCP research project establishment evaluation comprehensive indicator system is very important for guaranteeing the project quality, fairness of evaluation and healthy development of International Science and Technology Cooperation.

Table 1: ISTCP research project establishment evaluation comprehensive indicator system.

| Indicator                            | Evaluation Standards   | Indicator Value |
|--------------------------------------|--|-----------------|
| Cooperating country selection        | Cooperating country's attitude and openness towards China and its social, political and economical environment   | 0.043           |
| Strategic relativity                 | If the project is closely related to China's emphasized development fields and if it is listed in 863 plan, basic research plan and tackle key plans, if it is listed in governmental ISTCP protocol. If the project can resolve important social problem, economic problem, if it helps building up commercial ties and helping technological product and knowledge products and service to go to the international market. | 0.189           |
| Talent training                      | Help China's scholars understand science and technology frontier and broaden field of vision; study advanced technology and operation of advanced equipment; learn advanced scientific project management experience; train the elite of scientific fields and import excellent talent   | 0.096           |
| Political and diplomatic needs       | If it meets China's foreign policy object, improves international relationship and strengthen China's international influence  | 0.096           |
| Patent protection                    | If it is related to achievement sharing, patent application, copyright ownership, resource and other right protection agreement  | 0.076           |
| Project allowance budget             | If allowance applied is reasonable; allowance allocation is reasonable; total project financial plan is reasonable   | 0.080           |
| Chinese part level                   | If the academic and technological levels of the China part are advanced in that field in China; if the project principal of China part is the lead in that field in China; the basis and accumulation of China part is well compensative to foreign part; if both parts can form high quality cooperative team; if the China part is the best one for that task in China   | 0.060           |
| Foreign part executive level         | If the academic and technological levels of the foreign part are advanced in that field in that country; if the project principal of foreign part is the lead in that field in China; the basis and accumulation of China part is well compensative to foreign part; if both parts can form high quality cooperative team; if the foreign part is the best one for that task in that country                                 | 0.047           |
| Potential Influence                  | If the cooperative achievement can accelerate creativity. The cooperative achievement may lead to breakthrough progress in its scientific field and have influence to relative fields; it may have strategic influence to resolve significant social and economical problems   | 0.064           |
| Rationality of Anticipated Goal      | The objects put up is definite and clear, appropriate and broad, guaranteeing feasibility while exceeding current latest development   | 0.099           |
| Cooperation Plan and Manner          | Cooperation plan, rationality of method, maneuverability, advanced research artifice, correctness of research routine and creativity; rationality of time arrangement, possibility of fulfill anticipated object with high quality and in time   | 0.074           |
| Scientific and Technological meaning | If they are science frontier, top technology, international hotspot, can fill blank field in China; if they can improve creativity and realize span development  | 0.044           |
| Risk resistance of the project       | Scientific research is born somewhat risky. However, considering project leader's ability and project implementing parts' social, economic and political elements, if there are risk resistant measures and if there is hope to reach the goal successfully  | 0.032           |

### 2.2.2 ISTCP Mid-term Evaluation Comprehensive Indicator System

Deviation may occur during the process of project execution due to changes of environment or executive persons themselves. If such deviation is not discovered in time it may influence the realization of the project object. Therefore it is necessary to tracking and evaluating projects and controlling the whole project process in time. At the same time, judge the problems and their influence to the direction of the projects. To guarantee healthy development of the projects and enhance the success rate, we have built ISTCP mid-term evaluation indicator system.

Table 2: ISTCP Mid-term Evaluation Comprehensive Indicator System.

| Indicator                      | Evaluation Standards  | Indicator Value |
|--------------------------------|---|-----------------|
| Resource utilization status    | HR and equipment investment of both sides, outlay's carrying out status, if the outlay is used rationally, if is in accordance with plan, if it is truly used in the projects | 0.127           |
| Project phase achievement      | If the projects are fulfilled as expected, if quantity and quality of themes, new products, new material, new equipment and patents meet the anticipation                     | 0.200           |
| Expected completion of Project | Inferring the possibility of project's successful fulfillment from current process  | 0.131           |
| Project management             | How complete the management regulations and financial systems of both parts are, and how effective they are during the implementation   | 0.257           |
| Intercommunication system      | How complete the coordination systems of both parts are, how smooth the communication is, how effective the system is during the implementation                               | 0.128           |
| Patent protection              | Sharing of achievement, patent application, ownership of copyright, protection of resources and other cooperative benefits  | 0.157           |

wu 3/14/06 10:57 AM

Formatted: Font:(Asian) Chinese (PRC)

### 2.2.3 ISTCP effect evaluation comprehensive indicator system

A very important step of a project is the final effect evaluation. The evaluation should generalize the achievement of the project, and compare to the object of project establishment to determine the success of the project. Effect evaluation can also be reference for future project establishment evaluations. The result can also help best allocating of resources and guarantee the maximum proceeds of ISTCP. The evaluation can also reflect the experience and lessens of the decisions made for the projects and enhance the level of project selection and project management.

Table 3: ISTCP effect Evaluation Comprehensive *Indicator* System.

| <i>Indicator</i>                     | Evaluation Standards   | <i>Indicator Value</i> |
|--------------------------------------|--|------------------------|
| Science and technology level         | The Research achievements meet what scientific and technological level (lead internationally, equal to international level, lead in China, common in China, lower than China' s level). Quantity and quality of themes and research reports, new products, new material, new technology, new <i>process</i> , and patents                              | 0.155                  |
| Evaluation on Creativity             | Academic and technological creation. Academic creation means to build new concepts discovering new objects, new disciplines, build new <i>paradigms</i> , new theories, new methods. Technological creation means create or complete current production methods and measures, degree of adopting new theories, new technologies and advanced equipment | 0.149                  |
| Evaluation On Practicability         | The advantage of achievement to be transferred to productivity, and <i>usability</i> in production   | 0.124                  |
| Scientific and Technological benefit | To achieve valuable scientific and technological data, equipment, sample, resources and latest science and technology information; improve China' s scientific research level and realize span development; enhance China' s scientific project management level, push the build of new creativity system  | 0.073                  |
| Social benefit                       | Research achievement should benefit the material culture and spiritual culture, strengthen the potential and science and technology, social and nation defense development, protect natural environment and bio-system, and enhance China' s international reputation  | 0.030                  |
| Economical benefit                   | The research achievement should improve social productivity and increase GDP, strengthen international business tie, build new trading partnership   | 0.036                  |
| Investment to productivity ratio     | Comparing to China and abroad' s similar projects, if this project has advantage in the investment (HR, finance and equipment) and output (themes, research report, patents, new products, new material, new technology, social and economic benefits )  | 0.039                  |
| Talent training                      | Talent importing status; talent exporting status, numbers of lecturing experts, researching personnel' s achieving new knowledge and enhancing project management ability; subject and field leaders' being trained  | 0.079                  |
| Project progress                     | Project be fulfilled according to planned timetable and progress of the goals in cooperation plans (fulfilled in advance, fulfilled, not fulfilled)  | 0.155                  |
| Organization managing level          | The completion of coordination system, the smoothness of mutual communication, the effectiveness of the system implement, the healthiness of financial system.   | 0.096                  |
| Patent protection                    | Achievement sharing, patent application, copyright adscription, resources and other benefit protection status  | 0.064                  |

### 3. *ISTCP Evaluation System Platform*

Utilization of modern technology especially computer technology to automatic management is great extension of managing methods and revolution of modern management. ISTCP evaluation system needs a good evaluation platform, thus we built an ISTCP evaluation platform based on Internet. It

will greatly improve ISTCP managing efficiency and level, and bring China's international cooperation to a new ground.

### 3.1. Brief introduction to ISTCP project evaluation platform

The ISTCP evaluation platform has already developed the some functions: project establishment evaluating system; ISTCP mid-term evaluating system; ISTCP effect evaluating system; indicator managing system; user managing system; project managing system. The website is: <http://168.160.12.24/sub/> Here the function and guide of ISTCP evaluation platform are introduced, with example being ISTCP establishment evaluation system.

The evaluating system of ISTCP has the following interface. The experts log on <http://168.160.12.24/sub/> with their user names and passwords, select projects to be evaluated, then they enter the evaluating system. Grading standards for each indicator are linked by clicking the superlink following that indicator. The grade of each indicator is filled into the blank (full grade is 10), and click "finish" after giving the grades. Evaluation system backup database will automatically calculate the grades given by this expert, but he can not see the grade given by other experts. The administrator, after logging in, can see the grades given by all experts.

Fig. 2: ISTCP project evaluation platform



Other evaluating systems have similar operations and functions, and are not to be introduced on by one here.

Platform of ISTCP automatizes partial works, enhances efficiency, and standardizes and systematizes the daily management of ISTCP. It also helps with the tracking and evaluation of projects. The database system realizes easy indicator and inquiry, making latest progress be available at once, and history data be referred for the selection and evaluation of new project.

## References

1. Xu MK, Inspiration of the system of scientific and technological evaluation of developed countries, SCIENCE-TECHNOLOGY AND MANAGEMENT, 2005, 7 (6)
2. Bai Ning, International Science & Technology Cooperation projects' management of CAS, International S&T Cooperation, 2003 (3) : 34-36
3. Japanese Science and Technology Basic Plan (2001-2005), International S&T Cooperation, 2003 (2) : 35-43
4. Zhang, Ping, S& T Evaluation in Japan and Its Use for Reference to China, FORUM ON SCIENCE AND TECHNOLOGY IN CHINA, 2005 (2)
5. Liu Yun, International Science & Technology Cooperation in New Times, Forum on Science and Technology in China 2003 (3) : 3-6
6. Liu Yun, Capitalization And Commodity of Scientific And Technological Achievement And Protection of Intellectual Property Right, Science and Technology Management Research 1999,17 (5) 5-9
7. Dai Yanjun, The Present Situation and Countermeasures of China's Sci- tech International Cooperation, SCIENCE OF SCIENCE AND MANAGEMENT OF S.& T. 2001, 22 (12)
8. FU Jian-qiu, The New Trend of Science- Technology Cooperation and in Development of China, TECHNOLOGY AND INNOVATION MANAGEMENT, 2005, 26 (1)
9. Zhao HuanCheng, Analytical Hierarchy Process, Beijing: Science Publishing, 1986
10. Current status of the METI technology evaluation, technology evaluation and research division, industrial science and technology environment bureau. Technology Evaluation and Research Division. April, 2002.
11. UNDP/EO.A Handbook for Programme Managers: Results Oriented Monitoring and Evaluation . 1999.