

Foreign Present Condition of the Science and Technology Project Evaluation and Development Trend Research

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Abstract

The science and technology project evaluation is science and technology evaluation of importance constitute part, push national science and technology business to develop continuously and healthily, promote science and technology resources excellent turn to install, suggest a high-tech management important means and guarantee of the level. This text carried on for the abroad in advance national way of doing with evaluation of the science and technology project analytical, put forward evaluating to our country science and technology project according to its evaluation characteristics and the development trend of apocalypse.

Keywords: Science and technology project, Item evaluation, Developing trend, Evaluate system

The science and technology project evaluation is science and technology evaluation of importance constitute part, push national science and technology business to develop continuously and healthily, promote science and technology resources excellent turn to install, suggest a high-tech management important means and guarantee of the level. Reasonable valid evaluation system of the science and technology project for stir up science and technology personnel's creative potential betterly, construct science and technology to create new surrounding, promote our country science technique research development and nations be in line with, establishment and development which push forward national science and technology creative system have important meaning.

1. In advance national evaluation present condition of the science and technology item

1.1 Sign a choice standard

The abroad signs science and technology project a choice to mostly adopt go along discussing method, each the national science and technology project sign a contents of choice and standard each not same:

EU the third evaluation standard that science and technology develops a total programming to win election to choose science and technology project is: ①Match a programming target, be suitable for a multinational cooperation a research; ②science technique level is high, having unique and having a creative potential; ③has important industry value and competition ability; ④The realization of item has a possibility.

Germany's evaluating standard to the science and technology programming item is: ①Owe may that the project studies prevision: Whether involve science blank, The application of research result, market foreground, economic meaning etc.; ②Whether studying direction pursues merit and fame too or not; ③Whether study direction and development foreground are consistent or not; ④Whether study a direction to the society relation graveness, moderate consistently or not.

Korea concerning nation's studying contents of an project evaluation over a long period of time is: ①Settles sex of the item research target; ②Founds sex the item; ③The applicability of project research result; ④Possibility of the study method etc..

American evaluation standard of the science and technology project is: ①Apply for science value and quality of project. The main contents includes: How the application may be greatly enhanced the disciplines and other subjects of new knowledge. Whether organization and management plan of project is careful and attentive or not cans believe, whether has an enough research condition; ②What Applying for the project can produce a wider impact on society. The main contents includes: In the promotion of scientific discoveries, the increase in the accumulation of knowledge at the same time, the extent to which the project will promote education, training and research; Can build up studying equipments, information, database, network, cooperative-relationship and other infrastructure with increment; The extent to which the increased participation of the extensive personnel; Whether can expend the knowledge of science and technique to popularize; It is what towards satisfying a social demanding function.

1.2 Process management style

In the United States, Europe and other developed countries and regions, to manage and control science and technology project, regardless and theoretically still on the fulfillment and all already very mature. Especially after

80's in 20 centuries, with the rapid development of information technology, accelerating the process of economic globalization, urge it from science and technology project sign to evaluate the whole processes more standardized and internationalized.

The science and technology project of the United States adopts the management style of diverse dispersion type, government research institutes, universities and industrial research institutions this three research systems forming a unique technology management. The United States government manages to the foundation research item is firstly provide guarantee of funds, and the second is to provide laboratory facilities and create a favorable working environment. The scientist who is engaged in a foundation research can be free to use national laboratory, areas of research projects, research projects and the method of using funds research projects are responsible for their own decisions. For application development, it is divided into large-scale commercial projects and technology development projects. Large IT projects are usually related to the functions of government and national defense, public health and the cause of science and technology activities, it's specific programme of activities put forward by the Government research centre, reporting to the authorities concerned in Washington headquarters, the Office of Management and Budget and Appropriations Committee approved the examination and approval, then establish a homologous committee, at the same time responsible for the project management system design, makes, reliability etc. carry on an investigation, and tracking and manage the whole distances; the most typical of business technique development aspect is Advanced Technology Program, this program is managed by national standard and technique hospital, its executive body is divided into headquarters, carry out office and information resources department three parts, primarily responsible for daily administration, the intelligence-gathering work.

Japan's science and technology projects mostly commit to the project management units based on its own; the stage result report which subsidizes a square with the item is the main basis of evaluation. Japan's choice to science and technology project is very strict, in the project selection process exist three main options: the government section which is responsible for putting forward mission; be responsible for the academic organization section which organizes an item choice an activity; be responsible for an investigation and put forward the specialized research group who studies a project. On the management of funds, Japanese government attaches great importance to the budget management and supervision. Government has drawn up a "Science and Technology Basic Law," "Science and Technology Basic Plan" and other big country policies on science and technology, Provides for the future direction of the science and technology research for several years and its budget target amount. Government budget implementation process have a comprehensive set of technology project management evaluation system and budget supervision mechanism, once technology projects identified, one of its expenditure has to press plan performance, if need adjustment, subject to the consent of the competent government departments. Project progress need to periodically check, if discovering the problem should be put a forward adjusting opinion in time, preparation of the budget for the next fiscal year reference. The management of budget is carried out according to the plan by the project which responsible for to carry out, apart from the process of implementing the unit and higher-level departments in charge of strict management, and evaluation, the nation still establishes specialized national auditor's system, for the purpose of science and technology budget take charge of. Japan is changing the early way of equally assign doing of research budget, funds focus on financing research institutions and universities outstanding scientific research centre.

The science and technology project management style of Germany belongs to federal power system for cent, that is, through various channels to support science and technology, the government section is responsible for a macroscopic control, Through adoption of the control-oriented investment, pass the work that the index sign system evaluates academic section. The German Government have set up a complete system of examination and approval of projects: The government puts forward a research framework→The item unit declares →Medium lie consultation organization to provide a service and help to plan and prepare to declare a project →Evaluating organization carries on a reviewing and evaluate, put forward to a grant project →The government organizes an expert committee to research examination and approval. A lot of work during the period are responsible for intermediary organizations, these intermediary organizations are mostly nonprofit public-spirited organization, and they are responsible for the government and the public. Internal intermediary organizations according to their professional categories setup corresponding committees or departments, keep the authority position of professional realm, control the latest Dynamic research in the field, managing reported items of counterparts in the field. The project appraisal and management persist in publicly, fair and just principles, Government departments have small influence in it, let intermediary organizations, experts in various fields to be responsible for, to ensure that the most competitive strength to the scientists or scientific research units funded through a competition. At the same time, pay attention to guarantee the management of the project, units which can not complet the research projects will be subject to heavy penalties, this control means guarantee the finished quality and the success rate.

Science and technology research project evaluation of France is unified managed by the Department of skills, project is generally drafted and put forward by experts and scholars who are invited by the Scientific Committee, then adopt the way decision of public invitation to bid. To the topic which has already signed an item, Executive Secretary with relevant experts carry out an annual assessment every year, checking on progress, and evaluating the results achieved. If necessary, re-examine the original goal and orientation issues of state plan, this kind of circumstance generally assured by the science committee organization convenes bigger scope expert meeting. Budget which the government is used to support a national science and technology research and develops planned is issued in the name of the research and the technique fund annually. The project of foundation science research, even be included in a national plan, greatly parts of budgets provided by the each cooperation unit which attends the project. Since 1988, funds allocated to the National Plan of 3/4 use to support with a clear goal of industrialization of science and technology projects, and asked to participate in the projects of enterprises take out development budget of an equal funds complement project in the meantime. The French government still built up a set of direct system of integrity: Congress to the evaluation of science and technology-based option, congress assessment level assess the overall direction of the development of science and technology evaluation and review, provide argument for the government to choose a science and technology development direction; with the national research evaluate committee for lord, assessment level to government policy of the policy valuation, science and technology programming, evaluating major projects of government-owned science and technology organizations and agencies, providing a suggestion for the president and each section of government.

1.3 Performance Evaluation of the late

The science and technology project results evaluation is a key job of the management and science and technology management of the government public finance expenditure, and is to push science researches progressive powerful measure. Abroad have successful experiences in science and technology projects:

The United States is the nation which came into force a science and technology evaluation work at the earliest stage in the world, as early as 1993 January of U.S. Congress passed <Government Performance and Results Act>, that bill is the important law basis of American science and technology item and the government section performance evaluation. GPRA provision, each section has to draw up while making a budget, putting forward expenditure request 5 years strategic item, the enactment item year target, draw up a set of results index sign that can reflect a section accomplishment, easy to evaluation, and periodically provide long-term strategy a programming, year results programming and year performance result report etc. three kinds of reports. For the research and development agencies, GPRA performance situation can be divided into organization fixed position and performance measurement. In the meantime, basis the provision of that bill, the American government established National Performance Evaluation Committee in March, 1993, being responsible for the direct and the implement of bill. United States National Science Foundation (NSF) was founded in the 20th century early 1950s, is a section which is exclusively responsible for pushing forward American science and engineering business. NSF funded projects of its performance evaluation models and methods, can be used as performance evaluation of a prominent example. NSF divid science and technology project performance evaluation indicators into three categories: financing a result, internal management and investment process. Grants reflect on the results of the performance evaluation use of qualitative indicators, which reflects the internal management of the investment process and performance evaluations as much as possible use of quantitative indicators. In order to better carry out scientific and technological project performance evaluation, NSF special attention and performance objectives related data collection, verification and certification for IT projects to provide detailed statement that the contents of the report, and entered by the NSF maintenance network systems, for the efficient and enquiries.

The Australia is more and early one of the nations which carries out science and technology performance evaluation. Australia federal government comes into force the implementation of scientific and technological performance evaluation of the pilot project from 1985, starting promoting science and technology performance evaluation completely in 1993. The science and technology performance evaluation project of the Australia mainly includes three aspect contentses: the appropriate evaluation, efficiency evaluates and the usefulness evaluate, evaluate a point to decide the development stage of the place according to item target and item life cycle. Australia's evaluation of the performance of technology projects throughout the project implementation, its main step is: carry on project analysis, make sure an evaluation point; finding out the evaluation key problem that need to be resolved, make sure evaluation item and strategy; collections, analyze evaluate data; draft, release an evaluation report; look back a results evaluation; make use of an evaluation conclusion well. The management of nation to science and technology performance evaluation of technology projects mainly includes organization, implement, control and check, as well as toward the application of the evaluation findings. Some sections built up taking charge of committee, while taking charge of the direct of committee, evaluation team procedure by rule, to ensure the evaluation of managers

and team members perform their responsibilities. Australia on the project performance evaluation process control is based on the evaluation of the size and complexity of the set, such as the evaluation team meet regularly, analytical evaluation make progress circumstance, establishment a periodically check mechanism for evaluate a work. In order to promise the quality of science and technology performance evaluation, the government established the quality standard system of evaluation. Australia federal government drew up the principles of performance management information for better guiding their subordinate departments and agencies to report on the performance of drafting, requesting a results information should have clear in meaning and concentrated public.

Japan reduced to establish a policy evaluation study in the economic industry in March, 1998, draw up *Science and Technology Basic Law*, *basic science and technology projects* etc. great government policy, provision aftertime some year science and technology of research direction and it budget target limit. On this foundation, each province hall drew up a year <science and technology point indicators>, formulate the annual budgeting strictly. There is a complete set of project management evaluation system and budget oversight mechanisms in Japan government budget implementation process. Once the projects identified, every expenditure must be on budget implementation, if need adjustment, beard through the consent of the competent government departments. November 2001, the Japanese government also announced a <National R & D evaluation of the implementation of guidelines>, require the project progress regularly checked, the issue which foundede should be promptly adjustment, proposed for the next fiscal year to budget for reference. The project implementation unit responsible for managing fund, in addition to a higher level of the units and departments in charge of the strict management and evaluation in the process of implementing, the State also has a special system of national auditors to supervise science and technology funding.

1.4 Choiceing evaluation methods

Technology evaluation methods which foreign are commonly used can be divided into two kinds of qualitative and quantitative, among them, qualitative Evaluation Methods mainly includes Peer Review Act, the Delphi method, indicators and evaluation questionnaire and interview; quantitative evaluation mainly includes economic evaluation of the level of analysis, multi-attribute and multi-objective decision-making methods and fuzzy comprehensive evaluation method. Countries have each special features on the method choice of science and technology evaluation project:

Every year, Australia's scientific research institutions according to the science and technology planning cycle, periodically organize evaluates committee to carry on an evaluation to the in progress science and technology project exclusively, the basis for the evaluation of the project are the project identified by the research goals, objectives, the actual results and the actual impact on the social aspects of such evaluations; study on the basis of the United States, mainly in the institutes which are supported by universities and government departments; British Government in the major scientific and technological projects Alwi Most of the evaluation plan mostly adopt to hire an independent professional evaluation of the assessment unit.

Totally speaking, to the evaluation of projects in science and technology, all countries in accordance with the characteristics of various evaluation methods and the scope of application (see table 1.below), and choose the right combination of the actual project evaluation methods. (See Table 1)

1.5 Evaluation of operational mechanism

On the part of the National Science and Technology project evaluation mechanism mainly from the operation of the evaluation system and organizational structure set up to analyse two aspects:

1.5.1 Evaluation system

In 1993 the United States Congress enacted the *Government Performance and Results Act (GPRA)*, the concept and technology evaluation system, the United States Congress an evaluation of the role of science and technology, functions, powers and responsibilities are clear legal provisions identified, the bill requires all agencies, including those that support research institutions, establishment of quantifiable goals and report to Congress the annual progress. In addition, Japan, <Science and Technology Basic Law>(1995) and <Guide to the implementation of research and development>(1997) has proposed the establishment of an open study on the basic framework of evaluation, ruling Japanese technology assessment agencies can not be established or revoked. The French government does a provision in 1985, before having no process evaluation, any national science and technology plan the items all can't start. In France, the evaluation mainly concentrated in the two independent agencies: Evaluation Board and the National Council on the Evaluation Commission, the former through the creation of laws, the latter by issuing a decree by the Council of Ministers appointed, the term of office of evaluation, the evaluation target identification, evaluation report of announce, all have corresponding laws and regulations. South Korea, Australia and other countries where the evaluation activities in science and technology is required in accordance with the relevant laws of the institutions, in accordance with the statutory procedure, issued by the evaluation findings and

results of feedback to the relevant units.

1.5.2 Organizational structure

As the history of the world from different backgrounds, setup of the evaluation of projects of science and technology organization which countries engaged in is different. From the setting up of organizations can be divided into two properties: governmental and non-governmental in nature. In the organizational structure level can be divided into: national, local or state level, research institutes level.

The United States, France, England, Germany, Japanese etc. country science and technology evaluates system integrity; organization structure is very sound, having above two kinds of attributes and three layers keep both of situations. But different countries have different dependings, the German national technology assessment agencies was commissioned by the Government, anchored in a particular technology under management. Japan different from the United States, France, Britain, Germany is it have many high-level scientific and technological evaluation organizations, important of have already been close to 20, and only a few countries in Europe and America in general. The content of Japan Technology Evaluation mostly is the application of technological innovation, the content of Europe and the United States evaluation mostly is scientific research innovation. There are more entrepreneurs in Japan's technology assessment agencies, but science and technology assessment agencies in Europe and the United States have more scholars.

2. The characteristics and the development trend of the Evaluation of foreign technology

The science and technology evaluation project is one of the main type in science and technology evaluation, it has a direct relationship with the implementation of the National Science and Technology Plan and the efficient allocation of resources. IT project's planned, the research process and the resulting scientific and social values will have a direct impact on science and technology and social development. Science and technology project evaluations as a matter of policy to introduce science and technology management tools, the decision-making process more scientific level, has become the international trend. The United States, France, Germany, Japan and other developed countries through the development of science and technology and the implementation of the relevant laws and regulations, establish and perfect the technological project evaluation agencies, research standardize technology evaluation procedures and methods, has established a relatively complete scientific and technological project evaluation system. Integrated Technology developed the basic system of project evaluation, the following are the main features:

2.1 Project evaluation system for science and technology to give legislative protection

Technology evaluation is highly professional, highly technical content research activities, is institutionalized and standardized work behavior. Therefore, is to ensure that science and technology project evaluation work to the institutionalization, standardization and normal operation, need for the state to give legislative protection. The United States, France, Japan and other countries have established a comprehensive legislative protection technology project evaluation system, through the improvement of legislation, improve the scientific and technological evaluation of the legal status of the project so that the technology evaluation of projects achieve rapid institutionalization, scientific, systematic and standardized.

2.2 To ensure the independence of IT project evaluation institutions

Independence is an important principle of project evaluation activities. Foreign rating agencies and evaluation of practical experience shows that the higher the degree of self-evaluation, the greater the credibility of the outcome of the evaluation. Therefore, in order to ensure the objective, true, valid of evaluation results, we must ensure that science and technology evaluation of the high degree of independence, making the rating agencies to become the third party which independent of the rating agencies and evaluation.

2.3 Have perfect evaluation system of the science and technology project

The project evaluation systems of the part of the Technology the technology developed countries are more perfect, there are relevant laws and regulations system for the technology evaluation, complete evaluation institutions, explicit evaluation target and evaluation methods more mature.

The successful foreign technology project experience shows that, establish the perfect scientific and technological project evaluation system, can improve the quality of evaluations, standardized evaluation activities, and contributes to reflect the scientific technology and social values.

2.4 Science and Technology evaluation process standardization

France, the United States and Japan places great emphasis on the normative evaluation procedures, each of the sessions have detailed descriptions and detailed arrangements, and ready to accept public supervision at any time. in 1993, the United States Congress passed the <Government Performance and results>, the first time in the form of

state law, including the provisions of the Government Performance management technology evaluation. Develop science and technology project evaluation procedures to avoid project evaluation activities arbitrary changes in the procedures, so as to ensure a fair evaluation of the project, just so that the evaluation of the activities of all the participants from the evaluation activities are beginning to the end of law can be.

3. The enlightenment of foreign technology project evaluation experience to China

At present, the science and technology project evaluation has already been subjected tooped abroad off to an early start, and practice experience fulfill, its improved evaluation theory, evaluation system, and evaluation mechanisms for improving China's scientific and technological project evaluation, and strengthen scientific and technological research project evaluation has an important reference:

3.1 Strengthen the institutionalization of science and technology building project evaluation

Institutionalization is the current international trend of the assessment activities, in accordance with national conditions, China should establish their own technology for project evaluation system, the establishment of technology choices, the mid-term evaluation, and later finished all aspects of performance evaluation be expressly provided, thus ensuring science and technology, health, and orderly conduct.

3.2 Insist independence, objective and fair evaluation principle

In order to provide decision makers with the results of the useful analysis and reliable information, our country's scientific and technological project evaluations should ensure that the choice of evaluation methods, evaluation of the design and implementation of activities, as well as the completion of the evaluation report and other links are independent, objective and impartial, avoid in the re-evaluation process out, and the phenomenon of Latin America, and correctly handle the relationship between the assessment and decision-making in practice.

3.3 Value a science and technology project evaluation quality and evaluation an ability construction

In order to enhance the quality of evaluations and evaluation capacity building, our country's scientific and technological project evaluation agencies should develop professional appraisal standards and pay attention to evaluation experts and scientists, management experts communication, attention to the field of evaluation of the international exchange, through exploration and evaluation methods, training evaluation , the rating agencies as a learning organization, and constantly practice and continue to innovate.

3.4 Promote the innocation of the theory and method of evaluation

National rating agencies have attached much importance to the theory and method of evaluation research, such as the United Kingdom Alwi plan, Western Europe Eureka plans and national organizations to finance large-scale projects, have a set of effective evaluation methods. Our country should draw lessons from successful experience of foreign science and technology project evaluation, and combine to investigate to suit evaluation object physically and be advantageous to realization to evaluate the new mode of target.

3.5 Fully understand the technology project evaluation role in society

Technology evaluation as a modern society emerging professional work, have already been subjected to the widespread value of governments in all countries. China should fully understand the technology evaluation and immediate significance. Play its technology to enhance decision-making process of science, and raise the scientific and technological ability to regulate and control management, and promote science and technology management system, to enhance national development and implementation of science and technology projects to the seriousness of the major areas role.

References

- Dai, Guoqing and Li, Liya. (2005). Foreign technology Performance Evaluation research and reference. *Chinese science and technology forum*. (9).
- Huang, Jianguo and Lv, Likang. (2007). The characteristics of Japanese technology assessment system and its inspiration for China . *Chinese science and technology forum*. (4).
- Mao, Zhenqin, Cheng, Guizhi and Tang, Wuxiang. (2003). Science and technology project management model and inspiration of some technology developed. *Wuhan Institute of Industrial Journal*. (3) .
- Liu, Xiaojin and Li, Yicong. (2006). Role of technology assessment in science and technology project management. *Technology Management Research*. (1) .
- Qu, Li and Lv, Xiaolan. (2005). IT projects at home and abroad Evaluation Methods. *Enterprise economy*. (9).
- Xiao, Li. (2004). Discussion of national classification and evaluation of IT projects. Objectives and evaluation

procedures norms. *Science and Technology Management*.(3) .

Xu, Mingkai, Cuan, Liangqun and Ma, Yan. (2005). Inspiration of developed technology assessment system . *Technology and Management*. (6) .

Yu, Baolian. (2004). Inspiration of Foreign Science and Technology Evaluation to our country's scientific and technological achievements identification. *North China Institute of Water Resources and Hydropower Journal (Social Science Edition)*. (20).

Song, Haifeng and Xing, Xiuqing. (2007). Inspiration of US and the Japanese Government IT projects management to our country. *Information Technology*. (21).

Table 1. The project evaluation methods

Evaluation Method	Characteristics	Apply scope
Peer Review Act	The operation is simple, the conclusion is easy to an usage, but the subjective is stronger,and is difficult to evaluate the conclusions of convergence	Strategic target level of decision-making analysis
Economic evaluation method	The meaning is explicit, comparability strong, but the establishment model is more difficult, the data hard estimate, the conclusion may lose really	Large and medium-sized investment projects, enterprise equipment update and the development of new products benefit evaluation
Analytic Hierarchy Process	The credibility is higher, the error margin is small, evaluate the factor of object limited(generally and not much in 9), otherwise the conclusion isn't accurate	Cost-effective decision-making, resource allocation, conflict analysis etc.
Multi-attribute and multi-objective decision-making method	Object Description more precise, can be dealt with more decision-makers, many indicators, dynamic targets, but it is rigid evaluation, not involving the object of fuzzy factors	Optimization of the evaluation and decision-making system the applied realm is extensive
Fuzzy comprehensive evaluation method	According to different possibilities can be reached various levels of the problem, match the thought of gentle management, but can not evaluate the correlation between indicators of information duplication	Consumer preferences identification, the expert decision-making system