

STI OULOOK 2002— COUNTRY RESPONSE TO POLICY QUESTIONNAIRE**CHINA****1. General framework and trends in science, technology, and industry policy****1.1. Science and Technology Policy**

Marked by the 1999 National Technological Innovation Congress, the science and technology policy in China is turned to enhance technology innovation, develop hi-tech, and realise the industrialisation. At the current stage, the main contents of Chinese science and technology policy include:

- Encourage enterprises to be the main body in the technological innovation, fully improve the technological innovation ability of enterprises. The state owned enterprises shall take the establishment of complete and betterment of technology innovation system as the main content for establishing the modern enterprise system, take the improvement of technology innovation ability and management quality as the key methods to help enterprises to get rid of troubles and to be developed stronger and make enterprises the real main body of technology innovation. In order to survive and develop, enterprises must be oriented by market, enhance R&D and transformation and application of scientific achievements, improve economic benefits by relying on technological advancement and industry upgrading.
- Push forward the application type science research institutions and design organisations to be enterprises, fully promote the development of scientific enterprises. Further deepen the scientific and technological system reform, fully optimise the set-up of science force and allocation of science resources. In principle, application type science research organisations and design institutes shall be changed to be scientific and technological enterprises, wholly or partly merged into enterprises or turned to be intermediate service institutes etc. The government will continue to support scientific enterprise to enter into joint, key, and frontier industrial technological research activities through the bidding method of scientific and technological project. The existing social non-profit science research organisations shall carry out reform in different ways: for those science research institutes that are able to face the market themselves, they should be turned into scientific enterprise, wholly or partly merged into enterprise, or change into profitable intermediate service institutions. For those science research institutes that provide public service to the society and can not get relative economic return, to run and manage them following the non-profit organisation system based on structure adjustment and human resources relocation, the government shall mainly provide science research projects and base construction funds through favourable policy and competition methods. The science research organisations under the State Council (including the science research organisations changed to the enterprises) shall be administrated locally except small amount to be run by central government.

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- Enhance the work to construct state high and new tech industrial development zones, create high and new tech industrial base.

To establish high and new tech industrial development zone is a key achievement within the economy and science system reform in China. It is an affective method to develop high and new technological industry and suits the status of China. Currently it is needed to enhance the comprehensive and auxiliary reform of the high and new-tech industrial zone in China, improve the service function for various enterprises to convert high and new technological achievements, create good environment that can attract and gather excellent scientific and technological professionals and business managers to innovate and start up, and become key bases of technological innovation, industrialisation of scientific achievements and high-new technology exportation, make radiation and leading efforts in the regional economy development.

- Support and develop various private owned scientific and technological enterprises. The private science enterprise is a newly borne force in developing high-new technology industry in China, and has more and more important roll in the development of economy and technology in China. The state technological innovation fund for medium and small sized science enterprise shall support private owned science enterprises. It shall guarantee private scientific enterprise to take part into the competition for the government scientific and technological projects equally from the point of management system.
- Develop scientific and technological intermediate service institutions energetically. The scientific and technological intermediate service institutes are non-government organisations. They are indispensable service ties for science and the application, production and consumption. The country encourages some scientific research institutions with similar characters to change into scientific and technological intermediate service organisations as enterprises, and also encourages scientific professionals to establish this kind of enterprises. The laws and regulations on organising scientific and technological intermediate service institutions shall be made and perfected as soon as possible, so that to regulate the industry activity and enhance the administration. And guide all kinds of intermediate organisations like technological innovation service institutions, technological evaluation organisations and technological agencies etc., provide good service to speed up the scientific and technological achievements transfer. Develop information consulting service organisations actively, provide business management, technology, marketing, information, talents, accounting, finance, legal services for enterprises, especially those medium and small sized enterprises. For those intermediate service organisations that mainly provide public services to society, once certified, they can be operated and administered as non-profit organisations.
- Carry out supporting policy on finance and taxation. The finance departments at all level shall enhance the investment strength to science and technology. The investment ways of finance shall be changed from ordinary support to the science research institutions and scientific and technological professionals to project-oriented support; establish technological innovation fund for scientific medium and small size enterprises, and provide capital support to the high - new technology achievements conversion. Carry out taxation favourable policy on taxation to high - new technology products. Carry out government purchasing policy, guide and encourage government departments, enterprises and organisations to choose and order high quality domestic high - new technology and concerning equipment and products through budget control, public bidding etc. R&D funds for the science research institutes and high education institutions from the state can deduct from taxation income based on a certain proportion.

Turnover tax for income from technological transfer, technological development and concerning technological constancy, technological service etc. can be exempted from. For the enterprises within the software development and production, their software products VAT can be counted for 6%. Work out the favourable policy for the software sales enterprises, the real salary expands of software development and production enterprises can be deducted before income tax. For the export of high - new technology products, the zero VAT taxation policy is carried out. For the import of advanced technology and equipment that cannot be found in the country, the favourable taxation policy is executed.

Permit and encourage production elements such as technology, management etc. to take part in profit distribution. Make trials in some high - new technology enterprises, take out certain percentage from state owned net asset added value in recent years as shares, to prize staffs that contributed to the company, especially scientific and technological staffs and management staffs.

- Carry out financial support policy. Financial organisations shall give full play of support functions of credits, explore various efficient methods actively, and improve credit service to scientific and technological enterprises. Establish concerning authorisation and crediting system in accordance with different features of enterprises, complete funds management methods, extend types of credits, expand mortgage methods, enlarge scientific and technological credit input. Study and provide methods to solve the problems of loan mortgage for medium and small sized scientific and technological enterprises. For the scientific and technological projects that fulfil the conditions and can provide legal mortgage, they shall receive scientific and technological loans and technological modification loans at first priority. For the projects of high - new technology achievements transfer and technology improvement with prospective market, high-tech contents, good economic returns and replacing imported goods. The loan support strength shall be increased. The state provides concerning discount support to these kinds of projects. The state also provides support in credit and interest deduction for high - new technology product export.

Cultivate capital market that could benefit the development of high - new technology industry, set up venture investment system step by step, develop venture investment companies and venture investment funds, establish venture capital withdrawing system, enhance the support strength to the growing high - new technology enterprises. Introduce and train venture capital investment managing professionals, speed up the procedure of making concerning policies, laws and regulations, standardise market activities of venture capital investment, support certain high - new technology enterprises to enter domestic and international capital markets in priority. When the preparation is ready, set up in the proper time special high - new technology enterprise blocks at the existing stock exchanges in Shanghai and Shenzhen.

- Perfect administration system to scientific and technological professionals, encourage commercialisation of scientific and technological achievements. When the science research institutions changed into enterprises, they shall operate labour system and salary system as enterprises. Full employment system shall be the main one in those research institutions remaining under government support. Reform the current title system; promote position appointed employment system. The government in charging human resources of the government will no longer control the science research institution internal titles structure rate by quotas. In stead the science research institutions shall set up professional technical position and title ranks by itself in accordance with the needs of itself, and determining the position responsibility and employment conditions. The scientific and technological personnel have to compete for the position. Their position rank and relative salaries will last during employment. The science research institutes will carry out the salary system according to the post, the task, the results and internal distribution by itself.

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- Evaluate the scientific and technological achievements and carry on scientific and technological awarding system. According to the different features of various scientific and technical activities, the state carries out concerning evaluation standards and methods, reduces the number of prizes, increase the strength of prizes. Set up the highest national scientific and technological prize specially, to praise those outstanding talents who created enormous economic benefits or social benefits in the technological innovation, commercialisation and industrialisation of scientific and technological achievements.

The value of scientific and technological achievement, will depend on whether it is needed by the country, whether it can occupies the market and gain good returns. The appraisal methods to the R&D achievements or products need to be reformed and perfected. The achievement of projects planed by government shall trust to certified intermediate service organisations for objective evaluations, and organise inspection and acceptance according to the contract.

- Enhance administration and protection of intelligence property. For the scientific and technological projects financed by government, the intelligence property and information resources must be used fully, choose correct high start, and avoid low level repeat research. For the gained scientific research achievements, we must pay attention to apply intellectual property right to protect legal rights and benefits; give proper salaries and share right dividend to the position inventor, designer, author, and major applying people of the intellectual property. We must greatly enhance to promote the intellectual property laws and training program of the concerning people, guide enterprise, science research organisations and high education institutions to establish and complete intellectual property administration system. Further improve the intellectual property protection and legal awareness of the whole society, strengthen the intellectual property protection and law enforcement, investigate, firmly prosecute and punish those infringement activities, deal with the infringement activities to the intellectual property and disputes in time and efficiently.

1.2. General layout of scientific and technological development

With the gradual establishment of scientific and technological system frame that suits the socialist market economy and the self-development of science, the layout of scientific and technological development strategy in China becomes more and more clear. Guided by the principle of separate and co-ordinating functions of government and market, it needs to complete the major plan for key scientific and technological works from science to technology, then to technological achievement application, and its concerning conditions and environment construction etc.

1. Key scientific and technological works that support basic science development and sustained innovation ability.

These works mainly include two sides of basic scientific research and frontier high technological research, so that to provide scientific and technological base to support long-term development of the country and self-development of science. Its major plans and methods include:

- Key basic scientific research development plan of the state. Its principle is to encourage excellent scientists to carry out basic research projects in the major science fields that will have major impact on the development of economy and society. While based on the goal of state, try to make a breakthrough to promote the full development of basic scientific research in China and even to the scientific and technological works.

- Climbing plan. That is the key project plan of basic scientific research of the state. The plan aims at those scientific research topics with important scientific value and applicable future. It organises capable groups, and give strong investment, stable and continuous support, focus the strength on certain fields to make breakthroughs, make leading efforts to the country's development and scientific and technological progress.
- Natural science fund project of the state. It is an important channel for the state to support basic scientific research. Through the natural scientific fund the state receives free application from private person and institutions in wide range and to support basic scientific research and some of application research work, discover and cultivate talents.

Further more, there are works of facilities and base construction for basic scientific research, mainly include key scientific and technological projects of the state, construction of key labs and scientific research centre etc. of the state

2. Key scientific and technological works to support strategic adjustment of State's economy structure

With the transformation of strategy focus of the state, the key points of Chinese scientific and technological works have also historic changes. Lots of scientific and technological resources were invested into the scientific and technological fields and directions that could support the strategic adjustment of economy structure of the state, and groups of special projects supported by government investment.

- Scientific and technological breakthrough project of the state. It is aiming to the hot point, difficulties in the country's economy and social development that needs to be solved soon, choose key technology, mutual technology and production technology that have extraordinary affects to the country's economy and social development and industrial technology progress, organise forces to focus on key points. Choose and arrange a group of major scientific and technological projects that can solve the key problems that limit the development of country's economy and social development, speed up the improvement of traditional industry technology, the development of high technology and reform traditional industries. To promote the establishment and development of new industries, and push forward the continuous development of society, and during the progress, cultivate and create a group of high quality scientific and technological talents. To improve the scientific and technological strength and ability of self-innovation of China.
- High tech development and research plan ("863" project). It is a strategic high tech development project concerning the country's cross century development. The "863" project aims to the frontier of world's high tech development, concerning the finance and material strength of China, selectively follow the world's high tech development, to increase the competition strength for China in the 21st century. Its principle and goal is limited aims, focus on key points, and work hard to make breakthrough in advanced fields, shorten the distance between China and developed countries; meanwhile, cultivate and create new generation and high quality scientific and technological talents, and improve the overall strength of China.
- Technology innovation project. It is to improve technological innovation ability, set up technological innovation system and organisation that suite the socialism market economy system. The project predicted goal is to basically realise technological innovation system and operation system during the 9th Five-Year plan, taking enterprises as its core, guided

by government from macro point of view, actively participate by social service organisations, co-ordinate and co-operate by different sides. By 2010, basically complete technological innovation system and operation system that suite the socialism market economy system and self development regulations of modern enterprises; big enterprise shall be able to develop strong core technology, its products shall have high domestic market shares and certain competition superiority in the international market, therefore make technological improvement become the major methods for China to raise economy increase and profits, and become firm base for China to realise its third strategy.

- Joint development plan for production, education and research. Its aim is to use the economy, science and technology and education resources of the society, carry out co-operation between production, education and research, organise and carry out "production, education and research joint development plan", encourage scientific and technological forces of scientific research institutions and high education institutions to co-operate with enterprise, promote scientific achievements to be industrialised through various methods such as joint development, build technological development centre together, jointly establish economic share holding body etc., and therefore enhance the technological innovation ability, market competition capability and risk resistant capability of enterprises, gain obvious economic and social benefits.

3. Conditions and environment for industrialisation of scientific achievement

The country adopted series of measures in order to promote science and technology to combine with economy, promote science achievement to be industrialised. This shows the strategical thoughts of guiding industry structure adjustment and push forward the development of economy by science.

- Torch project. It is oriented by market, grasps the regulations of scientific and technological industrialisation, supports the development of high tech industry, speed up the steps of high tech achievements to be commercialised, high tech products to be industrialised and high tech industry to be internationalised. Since 1998, the Torch project has been focused on the construction of high and new tech business start-up service centre in the high and new tech industrial development area, and to enhance the Torch projects management, high and new technological internationalisation and construction of conversion base etc.
- Spark Project. Its principle is to develop agriculture by science and technology, flourish agricultural economy, speed up modernisation in rural areas. Since 1998, The project has worked closely with hot and difficult problems in agriculture and rural economy development, enhance the work to create scientific and technological development environment, promote science and technology to flourishing agriculture heavily in rural areas.
- State key new products plan. It is guided by the country's macro economy and industry scientific policy, mainly choose and support a group of high quality and new production projects that meet the domestic and international markets demands, with strong innovation features and great efforts to the industrial structure adjustment, to promote scientific research and production, scientific link and economic link to combine together, improve the scientific progress level and technological innovation ability of enterprise and scientific research institutions.

- Scientific and technological key achievement promotion plan of the state. Its principle is to create good environment and conditions, organise and plan big quantity of advanced, mature and suitable scientific achievements to enter the main battle field of economic construction, to form scale benefits; promote the adjustment of industry structure and industrial technological progress, especially the technological improvement of traditional industry; establish a group of technological research and promotion centre taking science and technology in guideline, and pilot projects of scientific and technological achievements promotion, cultivate and establish scientific achievement promotion system and operation system suitable for the socialism market economic system.
- State Engineering Technology Center. It is oriented by market, supported by engineering technological superiority, solve the key technology, auxiliary technology and other problems during the procedure when science and technology transferred into production productive forces, through the engineering research and development towards the scientific achievements, enhance the intermediate links of scientific research achievements transfer to the production. The establishment of engineering centre is mainly to develop mutual technology suitable to the economic massive production, and carry out the engineering and system integration of technology, discover the new operation system of close connection and encourage each other between scientific research and production, enhance the self development capability and market competition ability of Chinese industry.
- High and new technological industry development zone. It is a special area to promote the start-up and development of high - new technology and other industries. Through favourable policies and various reform methods for the high - new technology industry, to push forward the industrialisation procedure of science and technology, create main base for China to develop high and new technological industry. Currently there are 53 high and new tech zones approved by the State Council.
- Technological innovation service centre and productivity promotion centre. It is a major organisation part of the scientific and technological intermediate service system whose service function is socialised and in network. It is also the contents of the important work of technological innovation project of the state and technological innovation system taking enterprise as its core.
- University scientific and technological park. It is a kind of methods that depend on the talents and technological advantages of high education institutions, speed up the commercialisation of scientific achievement, promote high and new technological industry development. Its major goal is to make university scientific and technological park into incubator of high and new tech enterprises, breeding base of talents for innovation and business start-up and development base of high and new tech industry.
- Action plan of promoting trade by science and technology. The aim of the plan is to breed group of high and net tech export production and enterprise in superiority fields of China with strong international competition, high value added and massive exportation.
- Technology innovation fund of scientific medium and small size enterprises. In order to support the development of medium and small sized scientific enterprises, encourage scientific and technical professionals to establish new business and innovation, promote the development of Chinese high and - technology industry, in May 1999, the State Council approved to set up technological innovation fund for medium and small sized

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scientific enterprises. This is an important measure of Chinese government to promote science and technology to combine with economy, support technological innovation activity of medium and small sized enterprises.

- Sustainable development experiment area. It is the base for the country to carry out "21st Century Agenda of China", it is also the model area to discover the demonstration of regional sustainable development, promote reform of economy and social administration system. It mainly chooses representative and model city, county and districts of big cities, and towns in countryside, based on technological improvement, system innovation and system construction, improve the experiment area's sustainable development ability.

1.3. Scientific and technological organisations in China and current situation

The scientific and technological organisational system in China is mainly formed by government research institutions, enterprises and high education universities. They are the major carriers of R&D activities. Although there is small quantity of private research institutions for the moment, but their activity is very limited. These institutions gained legal position as non-profit organisations since last year. In 1999, there are 20 000 R&D researchers (FTE), among which 28.5% are in the government research institutions, 21.4% in the universities, 42.7% in the enterprises, and 7.4% in other organisations. The annual R&D expenditure is 900 million Yuan. Among which the government research institutions and enterprises accounts for 38.5% and 49.6%, universities occupy 9.3% and others 2.6%. With the acceleration of market procedure in China and establishment of country's innovation system, enterprises will play more and more important roll in R&D activities.

1. Research organisation of the government

The research organisation of the government is the scientific and technological organ mainly supported by the state. They play an important role in R&D activities and in increasing the technical level of science and technology of China. With deepening reform of scientific and technological system of China, the research organ of the government is undergoing deep transformation.

The research organ of the government belongs to the central government, provinces and local governments. There are many research organs of the county government, which mainly engage in scientific and technological promotion and service of agriculture, forest, husbandry and fishery. They seldom carry out R&D activities. Number of the research organs, which belong to the government of province and prefecture government is over 4000.

The funding source of the research organ of the government mainly is the government and income of the market etc. such as co-operation with the enterprises, technical transfer and the enterprises to be built by the research organs.

The funding source of the research organ mainly includes:

1. A certain amount of the operation cost given by the government
2. Undertaking the scientific and technological project for the government
3. Applying for various kinds of science and technology funds (such as the natural science funds etc.)

Though the funds from the government is not the main source in all the fund of the research organ. For R&D activity, the funds of the government is still the dominant source.

In 1999,R&D, number of the persons of the research institution was 234,000 of which the scientists and the engineers are 167,000, which was converted for 28.5% and 31.4% of the total numbers in the country. The number of the persons of the R&D of the research institution has increase or decrease every year. However the trend of the change was decreasing and till 1999, the number of the persons was decreased by 10.3%.

Chinese Academy of Sciences is the most important R&D institution, which mainly engages in the basic research and the high tech research. In the year, it has state level opening labs and the 20 state level engineering research centres. It has 170,000 employees of whom 21,900 are researchers. The expenditure of R&D is 10 millions Yuan.

To build up the state innovation system of China and optimise the localisation of the science and technology source, the state decided to reform the 380 research institution of the central government, of which the main activity is developing new products and new process since 1999 to make them enterprises or merge into enterprises, or science and technology agency and the institution for the technology population. And the government will support social beneficial research institutes. At the same time the research institutes belonging to the local government have the same change. The implementation of the policy will greatly decrease the number of the research institutes belonging to the government, especially the number of the research institution serving the secondary industry department will be greatly decreased and the competition of the enterprises will be enhanced technologically.

2. Enterprises

R&D activities in enterprises are mainly realised through their internal technical development institution. There are not many R&D activities of Chinese enterprises that have big differences from the demand of the development of the enterprises. However, for the development trend, the share of R&D of the enterprises is increased obviously. The position in the state R&D activities is gradually increased. The conversion of the research institution of the government to the enterprise has also enforced the trend.

In 2000, China stipulated that the enterprise of which R&D input reached 5% of the sales revenue would have the qualification to be certified as high-tech enterprise. The policy encouraged the input of enterprise in the R&D.

The expenditure of the funds of the R&D of the Chinese enterprises in 1999 was 33.67 billion Yuan, which was 6% of the country's total. 90% of the R&D funds are used in test production. The R&D funds input of the enterprises is low, which stays at about 0.7%.

In 1999, persons of R&D activities were 351,000, which accounted for 42.7% of the whole nation, and of which scientists and engineers were 32.4%.

To promote development of the high tech industry, Chinese government has totally built up 52 national high tech industry development zones since 1991. In the high tech zone, the high tech enterprises are mainly small and medium sized scientific and technical enterprises, which have high input for the R&D activities.

3. Institutions of Higher-learning

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At present, the share of R&D of the universities, especially for the basic research is low. In recent years, because the government has put focus on the role of R&D of the universities. The expenditure of R&D of the university has been increased rapidly. The increased rate is higher than the increased speed of the nation. Since 1998, over 1000 universities have been adjusted and merged in the country. The existing education sources has been adjusted and configured and R&D activities of the universities have been developed.

The funding source of the institutions of higher learning is from the undertaking scientific and technological plan of the government, applying for various kinds of funds and undertaking the R&D activity entrusted by the enterprise. In 1999, the fund expenditure of the R&D of the institutions of higher learning was 50 million Yuan, which was 9.3% of the R&D of the nation. The number of R&D persons of the institutions of higher learning was up to 60,000, which was 0.4% of the country. Proportion of the scientists and the engineers among the R&D persons is very high.

In addition, the state has also set up national 153 key labs and 50 national engineering and technological research centres in the government research institution and the universities, and also encouraged the large sized enterprises to set up technology centres.

1.4. The general concept of the scientific and technological development strategy during "10th five year plan" (2000 -2005)

1.Guiding policy and development goal

The general goal of the Chinese scientific and technological development: implement the strategy of developing the country with science and education, deepen the reform of the scientific and technological system, preliminarily set up the market economy suitable for the socialism and the state innovation system of the scientific and technological development law, speed up international competition of Chinese industry, promote the national economy to have sustainable development, improve living quality of the people, enhance the comprehensive fore of the state and guarantee security of the state, greatly increase the general level of the Chinese science and technology and the self innovation ability and fully increase the quality of the science and technology of the national people.

Objective of the scientific and technological development during the"10th five year plan":

1. The technical level of the industry and the international competition is greatly increased. The research and development system of the common technology of the industry will be set up with the prospective market, close relationship of the industry and in the key technical field obviously promoting the national economy development, the key technology and the common technology of the industry having autonomous intellectual property rights should be obtained. The technical support of the high tech and science industry development should be strengthened. A batch of the high tech industry development zones with first international rate should be established. The large sized enterprise and enterprise group, which are capable to involve in the international competition should be developed to promote the high and new tech enterprise to rapidly develop to make technical level of the main fields such as agriculture and the industry and the service field of China reach the level of the medium period in 90's of the developed countries and part of the field step in the advanced international rank.

2. The basic research and the strategic high tech research should be broken through. Greatly develop the Chinese economy, social development and the national security, which has key role and the important field with superiority in China with the concentrate efforts. Up to year 2005, the important science field and the strategic high tech field will reach or near the world level and a batch of the scientific innovation achievements with international significance will be achieved to lay down a solid foundation for the long-term development of the Chinese economic society.
3. Provide scientific and technological support for the population, resources and the environment. To establish perfect scientific and technological work system for the social development, protect ecological environment, improve quality of the population, improve living quality, increase utilisation rate of the resources, increase the capability of elimination of the disaster and protection from the disaster, social insurance and service ability, promote the social industry and the relevant industry to be rapidly developed.
4. Input of the science and technology of the whole society will be obviously increased. Up to 2005, proportion of the R&D funds of the whole society will be over 1.5% of the GRP. Proportion of the fund input of R&D of the enterprises will exceed 50% of the R&D of the whole society and over 5% of annual sale revenue for R&D of the high tech enterprises.
5. Scientific and technological talents will meet requirement of the development. International well known scholars achieving the important scientific results have been developed and collected, the senior specialists solving difficulties of the important system and the scientific talents suitable for the market competition have been trained. Up to 2005, number of the scientists and the engineers engaging in R&D will be 900,000 men year in the country.
6. The scientific and technological base facilities have gradually perfected. The new important scientific projects with international level have been built. Scientific base with first international level. The scientific and technological base condition and the base facilities have been obviously improved. The common sharing of resources has been realised. The guarantee ability of the scientific and technological ability has been increased.

2.Strategy and key task

During "10th five year plan", the Chinese scientific and technological work must be closely surrounding the core task of the strategic adjustment of the economic structure. According to the guiding policy of "innovation and industrialisation" and the urgent demand of the national economy and the strategy demand of the medium and long-term development of China, the strategic arrangement will be done for the two aspects of "promoting industry technological updating" and "increasing scientific and technological sustainable innovation ability". One is to take the enterprise as new body of technical innovation; the key task is to solve the key technology of the enterprises to push up the high and new technical industry development. The traditional enterprises will be reformed with high - new technology to promote the technical updating and the structure adjustment of the enterprises. The second is to bring full play of the role of the scientific research institution of the universities. The strategic high technology research and the original

innovation base research will be developed greatly to increase the sustainable innovation ability of the science and technology to realise technical development in the key field with relative superiority and strategic seizing. According to the above arrangement, the key tasks for the scientific and technological development during the "10th five year plan" are as follows:

1. Enhance the key and common technology to provide support for the strategy adjustment of the economic structure and the sustainable development

(1) Speed up the technological updating of the industry

According to the urgent demand of optimisation and adjustment of the industry structure, key point is to solve the core technology driving updating of the industry, having widely covering and wide integration and the complete integrated technology should be solved. The agricultural science and technology will be put in the first place. Taking agricultural product processing as leading, the technological level before the production and the postproduction. The agricultural structure should be optimised and the comprehensive efficiency of the agriculture should be increased. Implementing the strategy of "information drives the industry". Using the high and new tech represented by the information technology reforms the traditional industry to increase the technical level of the basic industry. Taking the manufacturing industry as key, mainly solve the major common and key technological difficult faced by the industry updating. Enhance engineering research of the applicable technology; increase technical content and domestic level of the complete equipment. Develop the core technology of the high and new technical industry and speed up the conversion of the achievement, promote scientific and technical medium and small sized enterprise to be grown fast, build high and new tech industry base, promote development of the high and new industry and develop new economic growth point.

(2) Promote social development

Focus on the sustainable development, select the key point according to the important issues such as the population of China, resources and environment, develop key technologies and make trial and demonstration. According the shortage of resources in China, particularly, the shortage of water resources, speed up reasonable development of the related technology and the related equipment of the resources. According to the serious pollution, natural ecology becoming worse in China, enhance research and development of the engineering and completion of the important technology and the environmental equipment and for the industrialisation base of the environmental technical demonstration has been set up to promote development of the environment protection industry. Taking Chinese traditional medicine as key to solve the key technology of the Chinese herb industrialisation. Enhance research and development of the drugs to drive development of the medical and relevant industry. Taking the objective of social industry development, according to the demands of the living quality of the people such as environment, medicine and health, culture and education and social healthy care etc. enhance social public technical research, develop advance and suitable technology and product, improve the living condition of the people.

(3) Increase scientific and technological innovation ability of the western area of China

According to the general plan of the western area of China made by central government and state council and based on the concept of the science and technology as leading, actively implement "scientific and technological activities of the western area development". Enhancing the scientific and technological innovation ability is put in the first place. The scientific and technological potential of the western area will be brought into full play, taking the ecological environment construction as centre, relying on the scientific and technological progress, the combination of ecological environment construction, local economic development and getting rid of poverty and realising wealth. Bring play of the superiority of the western area of China, mainly implement the water saving, development of sand industry, forest and grass industry and special industry, and the demonstration projects such as information technology application and technical talent training etc. to push the industry structure adjustment. Taking market as guide, push the local technical exchange and co-operation, set up information network of the technical connection in the western area of China to promote the science and technology such as information and talent etc. to move in the western area of China. The joint development of the east and the west area will be realised on the basis of each other superiority compensation.

2. Enhance sustainable and innovation ability of science and technology to realise leap-over development

(1) Research and development of the high - new technology

Referring to the development trend of the high - new technology in the world and the demands of the economic and social long-term development, the strategy, frontier high-tech issues relevant to the medium and long term development and safety of the state will be mainly solved. The issues should be solved with centralised efforts. From the demands of the high tech industrialisation of China, lead the industrialisation to create development condition for the high-tech industry in China. With efforts for 5 ~ 10 years, important high technical results with autonomous intellectual property rights will be achieved and obviously increase autonomous innovation ability of China's strategic high technology to strike for a place in the high technical field in the world and in the several fields and the key industry, realise leap forward of the technical development stage.

(2) Basic research

The basic research is the source of the science and technology and economic development. It is the leader of the new tech and new innovation. During "10th five year plan", the concentrated efforts should be made to support the national economy, social development and the major issue research of the science issue for the state security according to the strategy demands of the state and the international front of the technology to steadily promote the construction of the discipline and first support the important front research in the subject development to create the environment of free thinking, seizing truth and continuous progressing, encourage the scientists to do the probing research. The talent team should be developed to increase continuous innovation ability of the basic research of China. Climb up the scientific peak of the world with efforts to enter in the powerful country rank in the world with efforts for 10~15 years. China can basically solve the major scientific and technological issues of the economy, social development and security of the state by itself.

3) Increase autonomous innovation ability of the defence science and technology to enhance the support of the defence construction.

During "10th five year plan" period, under the guidance of military strategic policy decided by the central government for the new period, scientific and technological development of the defence should be done in accordance with the strategic objective for ensuring the security of the state and the territory completion of the state. The key point is to increase the autonomous development and innovation ability of the national defence of China to obtain the technology top in the future high technological strategy to increase the general technical level of the weapon equipment of China to speed up defence equipment updating. Leap over development will be realised in the key technical field and the major technical field of weapon equipment to provide the technical support for the development of the national defence equipment. The technology both for the military and the civil will be greatly developed. The high - new technology with great potential civil use will be developed in superiority to build up military and civil combination and good operation system of the defence science and technology research and development of the army and the people to realise bi-directional transfer and development of the defence science and technology and the civil technology to promote the new system forming of the defence science and technology industry.

4) Deepen the scientific and technological system and set up the innovation system of the state

During the "10th five year plan, the general objective of the scientific and technological reform is to further release the scientific and technological productive force and preliminarily set up the self development law meeting the requirement of the socialist market economy and science and technology and the state's innovation system with vitality to lay solid system foundation for the further development of the scientific and technological productive force. The key point of the scientific and technological reform is to optimise the arrangement of the scientific and technological force. Reasonable configuration of the scientific and technological innovation resources, enhance organisation construction of science and technological innovation, taking the system innovation as power to promote interaction and co-operation of science & technology and economy, science & technology and education, civil science & technology and defence science & technology. To perfect operation system of the innovation activities, expand external opening and exchange of the science and technology, keep the innovation activities and the social economic environment co-ordinated.

During "10th five year plan" period, further strengthen the development system of the science and technology, service system construction, strengthen combination of enterprise and university to form the innovation network and the operation system taking the enterprise as main force and interaction of R&D institution, university, agency service institution and the government institute. Continuously push up reform of the R&D institute. The internal institution structure of the technical development R&D institution will be continuously deepened on the basis of completion of the enterprise transfer, personal structure and professional structure adjustment. Taking the property right reform as key point, deepen the reform of the scientific and technological institution, set up and implement the social guarantee, tax favourable policy and system support policy reform taking the suggestion of the non-profit institution as core. The system reform of the social public welfare R&D institution will be done according to the requirement of the classified reform, mainly for the R&D institution of the social science field and the reform will be done according to the reform plan of the other type institution of the state. To try to build up new type scientific and technological system during the "10th five year plan" period to lay down good foundation for set up new innovation system of the state.

3.The key measurement and the support condition

1) Strengthen the scientific and technological talent team

Strengthen the guide of the macro policy of the government, bring full play of the market system for the basic action of the human resources arrangement, set up effective system of the talent encouraging and co-operative competition, perfect law and regulation system for the reasonable moving of the talent, to encourage the scientific and technological persons to create new, continuously implement various kinds of outstanding talent plan, to increase the integration quality of the scientific and technological team, optimise the structure of scientific and technological talent team, the key point is to create the teams such as the technical innovation, science research, scientific and technological entrepreneur, scientific and technological management and scientific and technological agency should be mainly built up.

2) Enhance the input for science and technology of the whole society

Fully use the market system, mobilise the active factors of all the aspects and greatly increase input for science and technology of the whole society. The active measures will be taken to push the enterprises to the main body of the science and technology input and continuously play the guiding role of the innovation fund of the small and medium sized enterprises, set up and perfect new investment and financing system and encouragement system, particularly suitable for the risk investment system, insurance system, scientific and technological credit system and the credit appraisal system of the high and new tech industry development to make the capital market become powerful support of the scientific and technological development. The various finance departments of all levels must surely add the finance input for science and technology.

The financial department will greatly add the input for the strategic high tech research, stably increase the input for the basic research, strengthen the agriculture and the social public technique of the industry, strengthen scientific and technological basic work and science input for the technological facilities construction and add the input for the army and civil two purpose technology, create good conditions and environment for the China scientific and technological development and the technical innovation.

3) Perfect the management of the scientific and technological plan

The scientific and technological plan mainly support major special project, basic research, research and development condition construction and the environment construction of the science and technology of the technical research and technical innovation. Strengthen the strategy research and the technical prediction of the science and technology, fully bring the play of the academicians of China Academy of Sciences and China Academy of Engineering in S&T policy making. Adjust S&T planning system, reform S&T plan management and avoid repeated planning. Establish scientifically a fare S&T evaluation system and perfect legal and regulatory system for the implementation of S&T plans.

4)Optimise the policy environment of scientific and technological development

Work out scientific and technological laws and enhance implementation of the existing scientific and technological laws and regulations, work out finance policy favourable for development of science and technology, financial support policy, perfect intellectual property tight protection policy and strengthen the protection of the intellectual property right, reform and perfect reward system of science and technology, work out income and distribution

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system favourable for innovation of the enterprises and the policy measures encouraging talents growth. Continuously improve work and living condition of the scientific and technological persons and to increase the treatment for the scientific and technological persons.

5)Strengthen scientific and technological population

Make full use of the public media such as news and press, broadcasting and TV, Internet etc. to develop scientific spirit, disseminate scientific thought and scientific method, promote practical technology, set up high social image of the scientists and technical experts, make the scientific and technological work respect by the people, make full use of the basic facilities such as the laboratory and museum etc., hold various kinds of activities of science and technology, open the relevant labs of the state, receive the teenager visit the lab, set up various kinds of communication channel of the teenager scientists, encourage all the nation to establish public welfare industry relevant to the scientific population, raise fund from all channels, set up a batch of scientific population base, encourage scientific population creative work, science exhibit and education product research and fabrication and scientific and technological book publication. Encourage the scholar and the specialists to go to the society, disseminate scientific knowledge, encourage creative and good social atmosphere of science and technology.

2. Public sector research and public research organizations.

In 2000, state financial allocation on science and technology was 57.6 billion RMB taking 3.6% of total state financial budget expenditures and 70% of which was from central budget. State financial allocation was primarily used for government science and technology program, state natural science fund, construction of infrastructure for science and technology and operation of government R&D institutions etc.

The main components of government science and technology program are including basic research, R&D on high technology and sector-related general technologies. They are mainly undertaken by government R&D institutions and higher education. Projects financed by state natural science fund, primarily applied by scientists freely, are dominated by basic research and complemented by applied research. In 2000, government funding was 1.3 billion RMB.

As far as infrastructure construction concerned, 163 state key laboratories are established in government R&D institutions and higher education. Since 1999, reinforcement of basic works for R&D have been made and major supports have been given to establish samples of resources, state basic standards and data banks.

In 2000, there were 491,300 people working for scientific and technological activities in 4500 government R&D institutions, equivalent to annual 230,000 personnel EFT among which annual 150,000 personnel were scientists and engineers. The total R&D internal expenditures, taking 28.8% of GERD, were 25.83 billion RMB among which basic research took 9.8%, applied research took 25.8% and experiment and development took 64.4%. Taking the R&D financing sources into account, government took 81.4% while enterprises took 5.2%.

R&D activities in higher education are primarily in universities. In 2000, annual 159,000 personnel EFT for R&D activities were in universities among which 149,000 were scientists and engineers. The total R&D internal expenditures, taking 8.6% of GERD, were 7.66 billion RMB. 58.6% of higher education R&D expenditures were from government while the remaining 32.4% were from enterprises.

3. Government support for private-sector R&D and innovation

In order to facilitate innovation of enterprises, state has implemented the torch program mainly focusing on facilitating application of new technologies in high-tech sectors, the star program mainly focusing on promotion of appropriate technology application to agricultural production and processing and the promotion program of key technologies. As for all these programs, the capital from government about 3% of the total investment needed, is mainly served for purposes of demonstration and guideline while the major amount of money comes from the applicants and financing institutions. The state key program for new products aiming at offering preferential taxation policies on tax reduction and exception and encouraging innovation of enterprises are adopted.

Promotion of small and medium sized scientific and technological enterprises is one of government priorities, so innovation fund for small and medium sized scientific and technological enterprises was established in 1999. In 2000, 660 million RMB was arranged to support R&D activities in the field of electric information, biology, medicine and photoelectricity.

Besides reinforcement of innovation system of enterprises are also emphasised, 53 national-level high and new technology development zones have been built up and enterprises inside the zone are entitled to enjoy preferential policies. Meanwhile 581 production promotion centres focusing on offering technology consultation and services to large and medium sized enterprises have been built up. Besides 209 technology development centres focusing on reinforcing R&D activities of large sized enterprises have also been established.

5. S&T human resources

In 2000, there were 21.65 million technical professionals in China which means they were either graduates in universities and vocational schools for studying science, engineering, agriculture and medicine or personnel holding technical certificates approved by the state and involving in R&D activities, teaching and production.

There are 3.224 million people involving in R&D and related activities in China among whom 2.046 million are scientists and engineers, which is equivalent to 63.4% of the total number of people involving in R&D and related activities. While 491,000 working for government R&D institutions, 2.14 million working for enterprises and 352,000 working for higher education take 15.2%, 66.4% and 10.9% respectively. There are annual 922,000 personnel EFT nation-wide among which government agencies, higher education and enterprises take 24.8%, 17.3% and 52.2% respectively.

In 2000, the number of graduates and post-graduates of higher education were 949,800 and 548,000 respectively. While the number of students studying for bachelor degree and master degree in universities 5.561 million and 283,900 respectively.