WORLD'S MAIN SCIENCE-TECHNOLOGY TRENDS FOR LAST TEN YEARS AND NEXT TEN YEARS

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Abstract:

During the last ten years the world's science-technology passed new trends such as enhancement of roles of fundamental research and social sciences and humanities, development of high techs, considerable contribution of science-technology for economic development, promotion of science-technology activities in enterprises, internationalization of science-technology activities, etc. They remain the main directions of science-technology during the next ten years with some deepening and extending adjustments of the previously established trends.

I. MAIN SCIENCE-TECHNOLOGY TRENDS FOR LAST TEN YEARS

A back vision of the first decade of the XXI century shows some notable development trends of the world's science-technology. They are interlinked suitably among themselves and with many fields of socio-economic development. The combination of inside and outside changes of science-technology fields create science-technology development trends in the changing world.

1. Trends of development of science-technology fields

1.1. Enhancement of role of fundamental research

The role of fundamental research is enhanced as infrastructure of many scientific disciplines. This infrastructure facility provides a platform for observation and test of natural phenomena, their re-production and simulation, access to quality data and development of capacities and skills.

Activities of fundamental research get enriched due to their closer position to applied researches and technological researches. This link inspires the continuous interlinks between fundamental research, applied researches and innovations. Of course, there are some technologies which are created without being based on fundamental research but based on their internal evolution. However many theories were set up on basis of interchange among the various scientific desciplines.

1.2. Enhancement of roles of social sciences and humanities

Social sciences and humanities demonstrate the deciding roles in leading aspects of researches and innovations. The roles of social sciences and humanities are seen through the creation of basis for the society to accept science-technology innovations: analysis of social expectations, exploitation of cultural and social changes are generated by innovations, studies of responding actions, etc. From another side, social sciences and humanities are responsible for moral or phylosophical problems which researchers are facing to. Social sciences and humanities participate also in setting up of inter-discipline interfaces in all the related key fields, namely aging problems or climate change, energy security or future Internet, sustainable development or use of nano techs. In the new context, social sciences and humanities are required to solve the newly scaled time-space problems which re-set the social-economic-scientific practial configuration, and add extending debates on basis of which the links are established between the science and the society.

1.3. Development of high techs

If the XX century experienced the dominating role of physics and chemistry then the XXI century will witness the one of high techs. High techs clearly demonstrate the main features such as keeping important efforts of R&D, having the strategical position of development of nations, changing products in a fast way, conducting large and risky investments (but bringing huge benefits in case of success), promoting compatitive R&D capacities, conducting production processes and searching markets in global scale.

In practice, the development of high techs get attention of many nations. Since 2001 the US started the National Nano Initiative (NNI) where the Federal Government provided the increasing supports for the program. The 2009 federal budget for R&D provided the NNI with USD1.5 billion valued support which is 4.6 times bigger than the USD270 million for 2000. In 2004, immediately after the announcement of the NNI, the US officially announced the New National Strategical Plan of Nano Technology. This master plan identified the objectives, priority fields and methods for implementation, break-through research directions, development of R&D infrastructure, promotion of technology transfer and studies of impacts of nano technologies to environment, health and social aspects. The White House's Director of science-technology policies took the stand that the implementation of the NNI would let the US to maintain its leading position in this field of science-technology and be the first to get economic benefits from the break-through new technologies.

In May 2008, the Japan Global Science-Technology Conference had announced "the Innovative Technological Strategy" which focused on break-through techniologies such as technologies of all-optic information network, spin electrons, 3D semi-conductors, carbon nano tubes. MMES, 3D imaging, high credibility software, high efficiency solar power generation, hydrogen energy system, etc.

In November 2008, the Korea National Science-Technology Committee approved "the National Basic Program of Interlinked Development" to promote four technlogies including nano technology, bio technology, information technology and knowledge science.

2. Promotion of contribution of science-technology for socio-economic development

2.1. Evident contribution of science-technology for socio-economic development

The most evident contribution is made by high techs. *High techs create the driving force for economic development in many aspects*, namely development and application of high techs contribute to create new vocational activities and products with higher added values, competitiveness and market potential. They give also contribution to modernization process and strong impacts to development of traditional production fields.

In some industrialized countries the science-technology including high techs make contribution of 60-80% to GDP growth. High techs bring in a considerably higher productivity in comparison to other traditional industries. High techs assist also the shift of economic structure, namely for increasing shares of high added value services (for example, in developed countries the services make 70% of GDP shares or information based services of the world made a growth of 6% per year during 2006-2008). In 2005 the high and medium techs based export made 65% of the total export value of OECD countries in manufacturing, agriculture and mining fields.

We have the similar picture for the group of Brazil, Russia, India, Indonesia and China. China and Brazil have the highest value of high techs for mining and manufacturing products of 55% and 32% respectively. The share of high tech products of China comes up to 35% which is much higher than the average value 23% of OECD countries [9].

2.2. Science-technology activities of enterprises

Science-technology activities are promoted strongly among business community. It is a strongly binding link between science-technology and production activites. In OECD countries, R&D activities of business enterprises make a big part of their budget for R&D. In 2005, R&D of business community increased to USD 542 billion making about 68% of the total R&D investment and they have a stable increase during the last 20 years. In OECD countries, the growth rate of R&D activities was strong during the second half of 1990s but experienced some declining since 2001. During 1995-2005 period, R&D of US enterprises increased 3.6%. The one of EU was 3.0% and the one of Japan was 4.6%. During this period R&D of enteprises in OECD countries increased USD143 billion and the US made 40% of this growth volume. In 2005 R&D of Chinese enterprises reached at USD 78.7 billion. In the UK, the Government's report shows that in 2006 the leading companies increased their R&D investment up to 9%. 850 biggest UK companies accounted for 21 billion British pounds of investment for R&D where pharmaceutical companies were the biggest investors [5].

2.3. Science-technology activities oriented to service for human society

During the recent years science-technology is not only oriented to economic activities but also to medical service and health care, environment and climate change issues.

The US started various medical programs, for example, "Human cancer genetic program", "Stem cell program", "Human genetic program" and etc.

In Japan, one of the three big objectives of "Science-Technology Basic Plan, Period 3" is to make this country a nation with secured, stable and high quality life. The Plan targets also to protect the population health in an aging society, reduce the natural disaster damages, provide stably foods and energy, regulate the relation between the global environment and economic activities, secure the stable international relations.

Canada, in September 2008, identified the concrete contents of the 4 R&D priorities in its science-technology strategy where the life science-technology aspects are the top priority, namely re-creation medicine, neurology, aging human organism, bio-medical techniques and medical technologies.

Finland Technology and Innovation Funding Agency, in March 2008, announced the key priorities for R&D and innovation in future. The new strategy key terms are human - economy - environment where the social wellfare and medical service are the first among the 8 top priorities.

Russia, in September 2006, announced "the Development Strategy of Pharmaceutical Industry to 2020" with the centralized targets such as the locally produced drugs to make 50% of local market shares, innovation of locally produced to increase drugs up to 75%, the export is to grow 3 times compared to the one of 2008, pharmaceutical matrials are to be encouraged to produce 50% value of pharmaceutical products.

3. Innovation of the State management system and policies for science-technology

3.1. Innovation of the State science-technology management system

Recently many countries re-organized their State science-technology management system. Japan is a country where the central government power keeps the key role in setting up of State policies and supports for research. Since 2001, however, the duties of global supervision and planning of research activities were assigned to the Commission of Science-Technology Policies (CSTP) under the Government Cabinet. The CSTP is composed of the Prime Minister, 6 Ministers of research and research support related fields, Chairman of Japanese Scientific Council, 5 Academicians and 2 representatives from industrial communitity. The CSTP is responsible to develop a global science-technology strategy over the whole country, set up the Government policy for science-technology human resource allocation (including budget and human resource) and evaluate the national important projects. In 2001, the number of ministries in Japan reduced from 20 to 12 thanks to merging measures to reduce public sevice agencies. For research activities these measures led to merge various related organizations and institutions. The most particular case wase the merger of Monbusho and Science-Technology Agency to establish newly the Ministry of Education, Culture, Sports, Science and Technology (MEXT) which is charge of 64% expenditures for the Government R&D in 2002 [1]. MEXT is to provide supports to universities, various research programs opened to researchers in public universities, Government research institutes and industries, and support its research organizations in their way to become Independent Administrative Institutions (IAI).

In Korea, the Ministry of Science-Technology had been abolished after more than 40 years of existance, Ministry of Industry and Resources, Ministry of Information and Communication were merged, Ministry of Knowledge Economy was set up. There is no more also the position of Deputy of Prime Ministry in charge of science-technology. The Ministry of

Education and Science-Technology and the Ministry of Knowledge Economy are two big Korean instritutions in charge of science-technology. The Ministry of Education and Science-Technology is in charge mainly for important matters of science-technology management and implementation, training of cadres of fundamental sciences and science-technology and regulatory system for their management. The Ministry of Knowledge Economy is in charge to issue policies for industrial technology development, implementation of large scale projects in field of industrial technologies and national development research.

In France, in order to enhance capacities to determine the strategical orientations and priorities, a Top Science-Technology Council had been set up under direct management of the President. This council has advising functions for Government decisions. It is in charge also to supervise the compatibility of large projects for research and innovation with the social expectations and benefits, in short and long term. At the same time, the State strategical decisions for research and innovation will be secured by the inter-ministerial council for research and science-technology.

Malaysia had set up the Government Science-Technology Committee under direct management of the Prime Minister. The Advising Science-Technology Council was also set up including the representatives from the Government, private sector and research community with the member share from private sector not less than 50% [10].

3.2. Promotion of effectiveness of National Innovation System (NIS)

The NIS includes R&D institutions, education and training establishments, Government agencies and market factors which are connected and coordinated to meet needs in new products, procedures and services which are accepted by market and society. With this approach, the center point is to create the regulatory environment to promote the innovation of products, services, technologies, organization and management mechanisms to bind R&D activities to socio-economic activities, to address the self-existance of any element in the system, particularly science-technology elements.

It is the approach applied by more and more countries for promotion of innovation capacities. In China, the National Technology Innovation Conference in 2009 was seen as the milestone in science-technology policy field of this country with the focus shifted to improvement of NIS. The 10^{th} Five Year Plan underlines a further consolidation of the science-technology development system, set-up of service systems, promotion of links between universities and enterprises to create enterprise-centered innovation network and activity system, between R&D institutions, universities, service organization s and Government agencies.

In Malaysia, the Second National Science-Technology Policy, period up to 2010, noted: ”It is necessary to set up a well defined system for management of the National Science-Technology Agenda” [6]. This direction would require the consolidation of NIS which includes a series of processes to attract joint or single organizations for development and propagation of new technologies. NIS will provide a framework where the Goverment plans and implements policies to activate the innovation process.

In Indonesia, the new science-technology policies dealt also with the set-up of NIS as follows: ”Up to now, the application of results gained from R&D organizations remains low because the whole domestic science-technology system does not have a completed structure to carry out its tasks and duties. For consolidation of NIS, the partnership is considered as a soft and fast contractual framework for management of cooperation between public sector (R&D organizations, laboratories and universities) and private sector for common benefits. A single action would bring less benefits if it is conducted separately. In addition, weak capacities would not creat conditions for implementation under contractual framework or regular linked conditions. The partnership here is intepreted as sharing and combining of resources for planning and supervising activities for common benefits as well as following the development raised afterwards” [6].

In Thailand, as measure to address weak aspects of NIS, the Government had set up the Science-Technology Action Plan (2002 - 2006). This Plan targets the science-technology development through cooperation network, domestic and international, to build up endogenous capacities for a higher added value productivities, higher life quality and sustainable development. The tasks are defined to set up and consolidate the domestic and international networks, enhance R&D and innovation level of human rfesources to facilitate the development of technological capacities in private sector and other sectors.

3.3. Some remarkable policies

Recent years witness the emerging trends of efforts in policies for science-technology and innovation. The Government budget for R&D investment gets important. The data of GBAORD (Government budget allocated on R&D) shows the relative importance of various socio-economic objectives such as defense, health care and environment in expenditure for public R&D activities. The US is keeping on the leading rank in defense R&D investment (0.6% of GDP in 2006). Russia is second ranked (about 0.4%) and the UK (0.2%). In 2005 the US took more than 83% of budget allocated for defense R&D of all the OECD countries which is 6 times bigger than the total investment of EU for this field. The US is also the country having the highest GBAORD for defense R&D up to 57% of the total Government R&D budget for 2005. The UK is second ranked with about 1/3 of GBAORD for defense and then followed by France (22%), Sweeden (17%) and Spain (16%) [9].

These efforts are expressed also through policies such as promotion of links between industry and science (joint projects of research between reseach institutes and industries, incentive programs and mobilization of human resources, support programs for SMEs to participate in joint research projects with universities, etc.), actions to change framework conditions for R&D activities (regulations for innovation, market competition, venture capitals, protection of IPR and other similar conditions), efforts to enhance "public sector scienctific infrastructure" (for example, increrasing expenditures for research infrastructure, laboratories), programs favor promotion of technology transfer and propagation (particulalrly for SMEs), enhancement of "application capacities" for actors of innovation systems which would be benificiaries of technology transfer.

4. Internationalization of science-technology activities

4.1. International cooperation

International cooperation is a specific aspect of globalization of research activities. The rate of international cooperation in co-inventions increased 4% in 1991-1993 to 7% in 2001-2003. The scope of international cooperation is different considerably between big and small countries. Small and less developed countries parfticipate more actively in R&D international cooperation. The rate of co-invention is particularly high in Luxemburg (52%), Mexico (48%), Russia (46%), Singapore (41%), Szech Republic (40%), Poland (39%) [17]. This particularity reflects the needs of many countries to pass over barriers of local market scale or the shortage of infrastructure neccesary for development of technologies.

The big nations as the US, the UK, Germany and France, from their side, are said to have the rate of international cooperation from 12 to 23% in 2001-2003. These countries extended also the scope of international cooperation. France, for example, increased the international cooperation from 8% in 1991 - 1993 to 16% in 2001-2003 [9].

The reference of documents is another measurement for scientific cooperation. The analysis is conducted for 4 types of references: individual authors, organizations-authors, domestic authors and international authors.

These factors show how the research community shares and propagates their knowledge and how the form of cooperation changes. The number of international co-authors and the one of local co-authors experience the same growth rate. In 2005, 20.6% of sceintific papers were writen jointly by local co-authors which is triple of the figure of 1985 [9]. The increasing number of co-authors, local and overseas, show the very important role of research cooperation in order to diversify knowledge sources.

4.2. R&D activities of multi-national companies

Recently the internalization of R&D activities gets popular in trans-national companies. When multi-national companies build more their research laboratories abroad the R&D activities of OECD countries are internationalized and get closer to the production activities abroad.

The rate of sub-companies abroad in R&D fields reflects also their efforts in comparison to domestic companies. In 2004, the sub-companies abroad conducted more researches and experienced a more dynamic development in comparison to domestic companies. The research capacities (percentage to revenues) of sub-companies abroad are considerably higher than home-based companies as shown by cases of Japan, Sweeden, US and UK(under their reports).

5. Increasing gaps in science-technology between countries and some emerging countries

Although of large scale but this technological revolution is not the same over the world. The science-technology gaps between countries remain large.

According to “Global Competitiveness Report, 2008-2009” annouced by “The World Economic Forum”, the US, though affected by financial crisis, still keep the leading position in the global economic compatitiveness system thanks to their advantages in economic structure and science-technology innovation capacities. The “US Science-Technology Competitiveness Report” for the financial year of 2008 prepared by RAND Corporation stated also that this country is still keeping clearly the leading position in science-technology fields. Regarding expenditures for science-technology activities, the 2008 R&D estimates of the Federal Government were USD 142.7 billion which was the highest level in the history. Regarding science-technology research infrastructure, the large program of scientific equipment of the Ministry of Energy arranged a chain of big research laboratories in some universities and federal laboratories to maintain the US leading science-technology position. These facilities provide the effective support for development of break-through research programs. Regarding science-technology outputs, "the 2008 scientific and work index" by the US National Scientific Funds and "Perspectives of science-technology and industry" by OECD show that the US still keep the leading position in the number of scientific papers, inventions and number of high skill work positon, namely the US scientific papers make 35% the world's total number, the US rate of quality citations makes 49% of the world's total number. The US takes also 38% of tripartite inventions of OECD countries which is more than 15 EU countries and Japan in total. The number of skill work positions increases from year to year with the average annual growth rate of 4.2%. Regarding the education, the US average investment by capita is twice of the other industrialized countries. The US takes 75% of the world's top 20 universities and 40 top universities, and 58% of the world's top 100 universities. Regarding talents, the US has the number of researchers triple of the one of the OECD countries. Every year the US receives over 500,000 foreign students and 40% of them follow technical fields, material sciences, life sciences, mathematics and computer science.

The drop back of many countries in science-technology fields may be explained by the shortage of capacities in development and application of new technologies. This situation may be caused also by the policies of developed countries. In fact, the developed countries applied many policies of "technological containement" toward developing countries, namely tough control of technology export, hard mechanism of "underlined co-export", enhanced supervision and management of foreign investments.

In addition to traditional science-technology powers, during the recent time, we can witness some emerging countries in science-technology fields, particularly in Asia. In 2002 the R&D activities in Asia passed over EU and in 2003 the R&D investment in Asia is 10% higher than the one of EU. In 2003 the R&D investment in Asia was 79% of the US. In 2003 in Asia the business community made 70% of the total R&D investment which is equal to the US rate, but the EU rate was lower, just 63% of the US. The number of patents of Asia increased intensively. China passes from position 16 in 1995 to one of the first countries. Taiwan, Korea and India are seen clearly in ranking table (from position 5 to position 11 respectively) The number of tripartite patents of these countries increased considerably since the end of 1990s. Since 2000 the growth rate of China, India, Korea and Taiwan increased annually from 20% to 37% [8].

II. MAIN TRENDS OF SCIENCE-TECHNOLOGY DEVELOPMENT IN NEXT TEN YEARS

1. Main trends of science-technology development of the last ten years will keep on during the next ten years

During the next ten years, the main trends of science-technology development of the last ten years will keep on. It is possible to this statement because the context of science-technology development does not change much. Science-technology' task remains to address the increasing population with related problems such as increasing needs, health care, epidemy prevention, terrorism violence and natural disasters, etc. From another side, the revolutionary changes of technologies follow a long term model which is statistically about 50 years/cycle[1]. In many countries, the science-technology plan is set up for both periods before and after 2010 such as the US Marine Climate Research Plan lasts for 2009-2014 period, the Japan Environment and Energy Research Plan lasts for 2008-2020, the Korea National Basic Science-Technology Development Plan lasts for 2008 -2012 period, the Poland Science-Technology Development Plan lasts for 2005-2020 period, the China National Long and Medium Term Science-Technology Development Plan lasts for 2006-2020 period, the Thailand National Science-Technology Strategic Plan lasts for 2004-2013 period, the Malaysia XXI Century Oriented Science-Technology Policy lasts for 2003-2010, the Philippines National Science-Technology Development Plan lasts for 2002-2020 period, the Korea Long Term Vision for Science-Technology Development last for 2000-2025 period, the Mongolia Science-Technology Master Plan lasts for 2007-2020 period, the Russia Pharmaceutical Industry Development Strategy lasts for 2006-2020 period, and others.

The continuation of the last science-technology development trends confirm the sustainable feature of the existing trends. The next ten years, however, would have their own prints. They will be a more clear and more concrete extension of the previously established trends.

2. More clear confirmation of some development orientations

The factors affecting science-technology activities are expected to appear and be known during the future time.

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[1] The history shows that the human race passed the different technological revolutions. The first technological revolution is the first British industrial revolution (the extending to the Europe and the US). The second technological revolution is the era of steam machines and railway in the US, Germany and then England. The third technological revolution is the era of steel, power and heavy industry in the US, Germany and then England. The fourth technological revolution is the era oil, cars and mass production in the US, Germany and then the Europe. The fifth technological revolution is the era of information technology and communication in the US, the Europe and then Asia. The sixth technological revolution is the era of nano technologies and bio technologies.

The challenges which the science is required to seek for solutions will be: commercialization of power generation methods which must be cheap, efficient and environment friendly, production of cheap and effective drugs, set-up of distribution network for treatment of transimissible diseases and dangerous epidemies, enhancement of effective use of water (up to 75%) in agricultural production, response to climate changes, improvement of systems for detection and monitoring of transmissible diseases. Other existing problems the science could help to avoid would be energy security, climate change related damages and losses, global epidemies and etc.

That would be the basis for the science- technology development to meet the real requirements and to give effective contribution to the human development and socio-economic development.

The science-technology will gain great achievements in break-through fields of technologies. As by RAND Corporation forecaste, the technolgies of 2020 will be the integration of numerous fields. They will change the society, create large economic and political strengths in global scale. By this, in 2020, the world will witness about 56 important technological applications where 16 technologies will have the large commecial potentials, such as the production procedure will reduce waste and then stop producing them in connection with reduced use of toxic materials (green industrial production), wireless tele-communication, telephone and Internet, communication and storage with fast access from any where and at any time, information encoding based on quantum mechnical methods, high security information exchange, use of RFID cards for monitoring of products from production site to selling point and then to users, high valued GMO with high nutrition values, high crop yield and reduced use of insecticides, etc.

At the same time, there will be great attentions to address the negative impacts of technologies. For example, nano technologies which deal with a very small size of things. They will create particles, fibers, membranes, covers and other materials of size many times smaller than ordinary microbes, namely of 1-100 nanometre size. When nano technologies will become a big technological power, they will make emerge many problems. The Center Responsible for Nanotechnology had recognize the serious hazards of nano technologies such as threats for health and environment (nano materials are capable to cause air, soil and water pollution and affect the human health), plenty of nano wastes (which are generated due to mass use of nano materials), risks of use of nano technologies by criminals and terrorists (Humankind will face to the smaller powerful weapons). These problems should be taken into consideration during development of the new techologies.

3. Orientations of development more concrete than the established ones

3.1. More promotion of important high techs for research and application

Future changes will demonstrate more clearly the chance of development of high techs. For example, from to 2020 bio technologies will develop deeply in direction of GMOs (further knowledge of genetical information will bring in some GMO based technologies), development of new concept therapeutic methods and drugs.

3.2. More innovations of science-technology policies

The science-technology development strategies and solutions for the next ten years of many countries would be focused on the innovation of Government R&D systems, enhancement of supports, promotion of science-technology and innovation activities of enterprises, promotion of cooperation and networking of innovative organizations, innovation of policies of science-technology human resource development, strengthening of international cooperation in science-technology fields and construction of a science-technology culture.

The NIS approach will be more respected. Efforts, however, will be made for searching and building up of NIS based on national identities. For exemple, China focuses its efforts on construction of a NIS with typical Chinese identities, namely: a NIS based on enterprises as subjective factors which would link and integrate efficiently three elements production - universities - research institutions to produce market driven technological innovations, enhance the national competitiveness, build up the knowledge innovation system to combine scientific research with higher education, build up the defence science-technology innovation system to combine military and civil objectives, build up a regional innovation systems to promote identities and advantages and build up a socialized and networked intermediate science-technology service system.

4. More extension of the previously established development orientations

4.1. Extension of high techs development over the world

The science-technology strategies of many countries for the next ten years will be focused on various and diversified fields of high techs. Some examples:

- **Thailand**'s technology priority orientations: bio technologies, information technologies and communication, material technologies and nano technologies;
- **Philippines**' technology priority orientations: bio technologies, information technologies and communication, micro-electronic technologies, energy, manufacturing and designing process, marterial science and designs, Earth science;
- ***Estonia***'s technology priority orientations: Information technologies, bio-pharmaceutic technologies, material technologies;
- ***China***'s technology priority orientations: bio technologies, information technologies, new material technologies, advanced manufacturing technologies, advanced energy technologies, marine technologies, laser technologies, space technologies (among these orientations China had selected 22 break-through technologies).

4.2. Enhanced role of science-technology as driving force for development

The role of science-technology seen as driving force for development will change radically the producing forces and will be socialized highly. It will make the world's economy develop and change very intensively, largely and deeply. It will make the human race transfer from *the Industrial era* to *the Knowledge era* which is characterized by Knowledge Economy.

Some forecastes show that the human race will enter the information era by 2010-2015. Therefore, thanks to the fast development of science-technology with high techs as core elements, the transition to *the Information society*, in fact, will be made during a very short time period, about 30 years, while the human race spent 300 years to pass to *the Industrial society*.

4.3. Science-technology gaps among countries

The RAND Corporation forecastes for the global technological perspectives by 2020 underline the differences in knowledge and technological capacities among nations. The propagation of new technologies cannot cover the whole world. The RAND Corporation analysis of actual conditions of 29 countries as representatives of different groups of countries and regions shows that 24.1% of countries have the advanced scientific level enough to aquire all the 16 leading technologies, 13.8% of countries have the scientific level fluently which permits them to master 12 important technological applications, 24.1% of countries have the developing scientific level which permits them to receive 9 of 16 technological applications, and the remaining 38% of countries, due to low scientific level, are capable only to receive 5 of 16 technological applications [20].

The gaps apart, the particular feature of the next ten years is the strong development of some emerging countries, namely:

- ***China***: by 2020 the annual number of patents and cited international scientific papers will position China among the top 5 countries, the use of local technologies will increase to more 60%, the dependence on foreign technologies will be limited lower than 30%, core technologies in manufacturing and communication will be received, space technologies and marine technologies will be developed. China will become a technological power where foreign technologies are used first and then adapted to Chinese standards;
- ***Philippines***: by 2020 there will be science-technology universities of the world level with the world classified scientists and engineers. The country will become a model of science-technology management;
- ***Korea***: by 2015 it will be a main country in the Asia-Pacific region to have a developed science-technology, and by 2025 it will be 7-th ranked in science-technology competitiveness and 5-th ranked by information index.

In this process the emerging China will affect much the world. A survey conducted jointly by IMD MBA, Fast Company and Egon Zehnder International in October 2005 had gathered the answers from 1,962 business experts in the US and other countries gave the result that China will take over easily the big share in the US market in fields of information technologies, cars and Internet. The conclusion of a recent study by the British Royal Society stated that China is preparing for an "important explosion" in the world scale./.

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