CHINA’S DEVELOPMENT STRATEGY: 
THE KNOWLEDGE AND INNOVATION PERSPECTIVE

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EXECUTIVE SUMMARY

I. MAIN ISSUES

China has made great progress since it opened its economy two decades ago and began a transition to a market economy. An extraordinary modernization process has taken place, particularly in the coastal areas and cities. New industries have been developing fast, enormous progress has been made in the business environment, and the country has considerably improved its participation in the global economy in which it is now a major player. However, important challenges lie ahead. These stem from a more demanding international environment, as well as from specific characteristics of China’s current stage of development.

A knowledge revolution, brought about by considerable technology advances (in information and telecommunications but also in life sciences, material sciences, etc), is taking place world-wide, deeply affecting economies and societies. It is also dramatically increasing global competition. China’s continuing transformation from a rural, agricultural economy to an urban, industrial and service economy creates strong pressures for continuous restructuring. These pressures will be compounded by the knowledge revolution and accelerated by China’s greater internationalization through accession to the World Trade Organization. We estimate that some 90 million new urban jobs will have to be created within the next ten years to absorb labor shed by the rural areas, compensate for job losses related to the economic restructuring, and provide the additional jobs induced by the projected increase in the labor force.

Against this background several broad trends are of concern.

- The high economic growth rates, seen over for the past two decades, based largely on capital accumulation and productivity increases have been declining gradually. The sustainability of high growth is negatively affected by the drag of poorly performing state-owned enterprises (SOEs), an overhang of non-performing loans in the banking sector, and the need to develop social safety nets to deal with displaced workers and an aging population.
- Income disparities have been growing, with increased gaps between the coastal regions and the central and western ones, and between urban and rural areas.
- Finally, environmental constraints and contingencies are mounting, challenging the long term sustainability of China’s factor intensive growth strategy.

China’s recent industrial strategies have consisted primarily of focusing on introducing modern production and exports, jointly developed with foreign investors, in designated zones mostly located in the coastal part of the country. These zones have enjoyed significant growth rates. However they employ only 2.2 million workers out of a labor force of 700 million and are small
islands in the more traditional ocean of the whole Chinese economy. On the technology front, China’s R&D effort is only 0.7% of GDP, which is low by international standards, and is barely 1% of global R&D. Its output in terms of international patenting is negligible. China thus needs to develop a broader innovation strategy that not only focuses on high technology and R&D but also improves its productivity and increases its overall competitiveness.

II. A KNOWLEDGE RATHER THAN A FACTOR-BASED DEVELOPMENT STRATEGY

To cope with the challenges brought about by the knowledge revolution and increased international competitiveness, as well as the employment implications of the massive restructuring that China will be undergoing, a knowledge-based rather than the current factor-based strategy is needed. This knowledge-based strategy consists of making more effective use of new and existing knowledge and technology throughout the whole economy. There are four key pillars to this knowledge-based strategy:

• An economic and institutional regime that provides incentives for the efficient use of existing knowledge and the creation of new knowledge and entrepreneurship.
• An educated and skilled population that can create and use knowledge.
• A dynamic information infrastructure that can facilitate the effective communication, dissemination, and processing of information.
• An effective innovation system where enterprises, research centers, universities and other organizations interact effectively to create and diffuse technologies using the growing stock of domestic and global knowledge.

The economic incentive and institutional regime allows organizations, people, and institutions to adjust to changing opportunities and demands in flexible and innovative ways. In a sense, it is the fundamental pillar of the knowledge-based economy. The absence of a strong economic incentive and an institutional regime that deploys these resources to productive uses can fundamentally reduce returns from investments in a strong educational base and/or a highly developed R&D infrastructure (as is the case in Russia, for example) or from a highly developed telecom infrastructure. On the other hand, the education and skills of the population, the information infrastructure, and the innovation system also have to be strengthened to exploit the potential of the knowledge revolution. Thus, the four pillars of the framework are essential for the knowledge-based economy, as broadly defined. Annex 1 elaborates on the framework and gives a preliminary assessment of how China compares to 60 major economies. It shows that China still has a long way to go on all dimensions.

This report focuses primarily on the innovation system. In this report, innovation is defined as use of technologies new to the local context. Therefore it includes not only the new technology produced by domestic research, but also the use of foreign knowledge, as well as the diffusion of new and existing knowledge and technology to new users. However, it is not possible to discuss a meaningful innovation policy without addressing at least some of the main elements of the other pillars of the framework that are critical to the effectiveness of the innovation system. We will, therefore, briefly address some of the issues in the broader framework before focusing on
the innovation system. We limit ourselves in this executive summary to the presentation of the principal recommendations.

III. POLICY RECOMMENDATIONS

The role of the government in the knowledge economy is basically to promote and discipline markets and provide, or facilitate, investments in the necessary public goods, such as education infrastructure, basic research, telecommunications, and innovation networks. It is precisely on those points that we focus our recommendations. The socialist market economy regime has made an invaluable contribution to Chinese economy. However, in some areas, the right balance between State intervention and disciplined non-State actions, and between true market mechanisms and market-mimicking bureaucratic measures, is yet to be found. These issues are also rooted in deeper historical and cultural features of China. The recommendations below point to a redirection of the role of the governments – both central and local – to improve the broader framework and to redirect the innovation system.

A. IMPROVING THE BROADER FRAMEWORK

1. Upgrading the legal and regulatory environment
   - enforce the existing competition-related laws (including those relating to intellectual property rights) by strengthening the judicial system;
   - clarify the regulatory setting affected by complex and contradictory legislation made by different power layers, and remove regulations inhibiting innovative initiatives;
   - improve the soundness and allocative efficiency of the financial system, and establish an effective venture capital market, including a well functioning secondary market (such as NASDAQ) to finance new innovative enterprises.

2. Exploiting the information and telecommunication infrastructure
   - expand cheap telephone access to all of the Chinese population within the next decade by exploiting the leapfrogging possibilities offered by the new technologies (satellites, mobile phones, etc) by making greater use of private investment but also ensuring that universal access is made available to marginal populations;
   - abolish the monopolistic positions currently occupied by China Telecom and its subsidiaries; and open entry to Chinese and foreign companies, as providers of both infrastructure and services;
   - liberalize access and use of the Internet, restrict controls of communications and web site to cases of fraud and ethical violations, and develop the Internet infrastructure (bandwidth) to rapidly put China at a par with international standards.

3. Investing in higher education and training
   - integrate private education establishments fully into the formal education system in order to satisfy the large and growing pent up demand, and recognize the degrees they grant (provided they fulfill accreditation standards);
   - deploy a nation-wide technology-based learning grid, using long distance TV and Internet, and using inputs from universities and other institutions;
• set-up re-training organizations on a large scale throughout China to facilitate the retraining of workers that are displaced by the restructuring of the economy.

B. REDIRECTING THE INNOVATION SYSTEM

1. Expanding Technology Dissemination programs
In order to cope efficiently with the upcoming economic and employment restructuring following WTO accession, strong priority should be given to programs that aim at a massive dissemination of technology in the economy:
- fund technology dissemination organizations (such as engineering research centers and productivity centers) sufficiently to ensure that they properly fulfill their role of technical research, information and assistance; and double their number within the next five years and establishing most of the new organizations in the central and western parts of China;
- develop for the rural sector a comprehensive strategy that provides technical and financial support; expand TV-based training and renovate the Spark program to spur further development of rural industries; and
- deploy throughout China instruments such as enterprise incubators and innovation centers at a rate of 100 per year, locating them near business and education communities.

2. Benefiting from global knowledge and technology
To benefit more from knowledge and technology available worldwide, it is important to:
- negotiate mutual cooperation agreements with foreign investors that ensure strong transfer of information, skills, and technologies, through training, research, subcontracting operations; and extend such cooperation rapidly to most of the services sectors;
- develop further policies and incentives aimed at attracting back to China the considerable pool of the Overseas Chinese talent; and
- encourage further internationalization of the research system by developing mutually benefiting R&D collaborations with multinational enterprises, expanding cooperation in global science programs, and facilitating exchanges and travel of scientists.

3. Strengthening the research system
In order to build up more solid bases for long term growth, it will be necessary to:
- maintain, and if possible gradually increase, the level of support provided to basic research, and research that is of use to the public as a whole (including for agriculture and industry);
- rationalize public support to R&D in the enterprise sector, focusing it on smaller firms; establish tax incentives for R&D in all sectors; and
- limit large scale R&D programs to those related to procurement of public goods and services.

IV. IMPLEMENTATION

In order to put in place a coherent and efficient action plan:
- give local governments (provincial and city authorities) a prominent role in elaborating and implementing regional strategies and policies;
- strengthen coordination capabilities in the central government to ensure effective policy integration among ministries and plans; and
• **improve the efficient use of the current state budget for innovation activities.**
  --establish effective monitoring and evaluation systems, and rationalize the current allocations of resources;
  --increase government funding gradually so that by the third to fifth year of the Tenth Plan, an additional 10 billion yuan per year is allocated to the support of the innovation system. This should be financed on an equal basis by local and central governments; three-fourths of the additional resources should be invested in technology dissemination efforts.

• **leverage the limited resources of the state by tapping private resources.**
  --fund telecommunication infrastructure development largely by allowing entry of private domestic and foreign capital and by auctioning rights to lucrative markets, along with obligations to provide low cost service to marginal areas;
  -- fund additional rapid higher education expansion largely by tapping willingness of students to pay, and of private educational institutions to provide relevant higher education. A part of the public funding need could be met from the “demographic dividend” of having fewer school children over the next 20 years.

The entrepreneurial spirit of the Chinese people is considerable. Resources exist. The recommendations made above are all eminently doable. In fact, Shanghai has essentially implemented virtually all of them already (see Chapter IV). The key is the political will to undertake reforms. Primarily, they have to do with continuing to improve the economic and institutional regime to release the entrepreneurial energy of the people and to create self-adjusting processes. Besides this, perhaps the most important step is to open up the telecommunications sector to competition and to rapidly expand Internet access and use. Rapidly expanding access to information and communication will help to catapult China to become a knowledge-based economy. It will also help to make more transparent existing inefficiencies in the system (such as the need for a credit system to do electronic commerce) and permit leveraging limited resources over a vast population (distance education, health services). What is thus required is a self-confident, proactive strategy to take advantage of the knowledge revolution. How far China will advance will depend on how fast it embarks on the pace of required reforms.

At the start of this new century, we suggest that the slogan of **the State as a ‘Clever Regulator’** be promoted by appropriate campaigns. This new role of the state is to develop markets and to set up institutions and procedures to discipline them so that they operate effectively. It is also to address public goods issues such as funding basic research and the articulation of networks, standards, and other mechanisms that may not develop very effectively without its catalytic, coordinating role. This image would replace the image of the visionary planner characteristic of the communist regime in the industrial era, and further back in history to the image of the wise administrator in the feudal regime of the agrarian economy. In its new role the state will be able to usher in a new wave of reforms which will help unleash the creative potential of the Chinese people.