

# **“Evaluating Chinese Approaches to National Innovation: Comparative and Sectoral Perspectives”**

## **Summary**

China’s commitment to technology development has been remarkably sustained, but important new policy initiatives have marked the past decade. At the end of the 1990s, the Chinese innovation system changed dramatically as new areas for bottom-up innovation and entrepreneurship were opened up, and resources and responsibilities were delegated to firms. Subsequently, in the early 2000s, national innovation strategy took a distinct turn to a heightened emphasis on “autonomous innovation.” The new national strategy involves both increased resources and important strategic policy choices. After nearly a decade, the time is ripe for a serious evaluation of China’s recent strategy and system.

A conference at the University of California, San Diego on June 28-29, 2010, will examine China’s current national innovation system and strategy. Participants are asked to examine the transition to autonomous innovation in China through one of two different approaches. A comparative approach will examine the experience of a specific country (such as Japan, Korea, Germany or China itself), and draw lessons for China. A sectoral approach will examine the technology trajectory and experience of a specific sector. Bringing these approaches together, we hope to draw up a preliminary evaluation of China’s recent innovation experience as well as chart a course for future research.

## **A Decade of Dramatic Change**

China’s commitment to technology development has been sustained over the past thirty years, with rapid learning and fast institutional development. During this period, though, the specific policies used to support technology development have varied substantially. Only in the period after 1998-99 did a new stability arise in China’s technology policy. Substantial responsibilities for technology development were delegated to firms (including state-owned enterprises), and many areas were opened up for bottom-up innovation and entrepreneurship (from private and hybrid firms). Resources and responsibilities that had previously been under the control of government research institutes were at least nominally spun off to enterprises, and research institutes concentrated their efforts on a more highly targeted set of objectives. The new system quickly produced important changes in the level and distribution of China’s innovation effort.

Moreover, within a few years the government commitment was increased and broadened to a new set of national strategic objectives. A national commitment to “autonomous innovation” was incorporated into a series of programmatic documents in the mid-2000s, and also into a range of practical policies. In many specific areas, the government technology effort was increased, even as policy continued to support the shift of most technological effort to the enterprises. The movement toward “autonomous innovation” enjoys broad-based support in China, and this strategic objective has been manifested in many different policy arenas. For example, the creation of the Ministry for Industry and Information Technology (MIIT) was driven by the desire to integrate innovative IT into every sector of the industrial economy. An aggressive effort to promote indigenous technological standards has also been part of this effort.

China’s most recent technology development push is based on a conceptualization of China’s performance and prospects in terms of four sequential stages:

- Duplicative imitation, in which China simply copied foreign technologies with little refinement. This is generally thought to have characterized the 1950s through the 1970s in China.
- Creative imitation, in which copied foreign technology remained the foundation for technology development, but the effort of indigenous adaptation and the relative weight of indigenous improvements have increased. This is said to have characterized Chinese policy and reality during the 1980s and 1990s.
- Early autonomous innovation, in which indigenous technology becomes the foundation for the country’s long-term technology development. The premise of Chinese policy since 1999-2000 is that innovation can now be lifted to this level. However, there remains a significant reliance on adaptation and integration of foreign knowledge and technologies. Indigenous technological standards still lag advanced world levels by 1-2 generations.
- Advanced autonomous innovation, in which China finally begins to catch up with international advanced levels. This is a key objective for the Chinese authorities and will likely be a top priority in the coming decade.

Along with these changes in innovation policy, China’s rapid economic growth has been accompanied by high levels of investment in physical infrastructure and human resources. Thus, there are many factors contributing to China’s improvement of technological capability. It is therefore not surprising to find that by almost every measure, China’s innovative capabilities and research output have been growing rapidly since 1998-99.

Through the present, however, there has been relatively little research on the actual impact of China's new technology policies, which are, after all, quite recent. Does the four stage conceptualization underlying the Chinese effort correspond to the realities of technology development? How do we know when China progresses through each of these stages? Is it in fact the case that China is moving from "creative imitation" to "early autonomous innovation" (and ultimately to advanced innovation)? Could it be that continuing incremental innovation is more important for China's immediate future, particularly in improving economic efficiency? "Autonomous innovation" is a useful concept that should also be challenged and tested against competing interpretive frameworks.

## Comparative Perspectives

Other economies have already made the transition from imitation to autonomous innovation. Japan and South Korea, for example, are acknowledged to have moved rapidly and successfully from imitation to innovation. The East Asian cases are particularly relevant because of the similarities between their initial conditions and those of China today, and because Chinese policy-makers are generally seen to have been influenced by the perceived success of technology policy in those economies. Comparative experiences from Europe and the United States can also shed light on contemporary China.

Japan and South Korea have both clearly made a successful transition to autonomous innovation. Firms in these countries have achieved a significant measure of global technological leadership. At the same time, each economy has been shaped by past patterns of innovation policy in ways that have both costs and benefits. For example, there are cases in which Japanese firms have achieved technological leadership, but have lost competitive position. Ironically, there are parallel cases in which U.S. firms have enjoyed improved competitive position despite having lost technological leadership. What are the complex tradeoffs between support for technological leadership and economic competitiveness? While there is no doubt that technological leadership may sometimes translate directly into competitive advantage, in other cases the quest for technological leadership may involve sacrifice of competitive position, particularly in low and mid-range markets. Moreover, government policies involve complex trade-offs, as support for one type of innovation and investment may unwittingly disadvantage and discourage other economic models.

What do the experience of Japan and other developed country fore-runners tell us about the complex transition from imitation to autonomous innovation? Are there specific policy lessons or "best practice" examples of the transition? Are there clear lessons about pitfalls to be avoided? More broadly, are there identifiable tipping points at the macro and sectoral levels that can be pinpointed and analyzed? How similar or different is the Chinese case compared to its East

Asian neighbors, especially given the changing techno-economic paradigm that exists today compared to the late industrial era of the 1970s and 1980s?

## Evaluating Policy and System

The time is appropriate to assess the outcomes of Chinese technology policy over the past ten years. Such evaluation cannot be done on an overall basis, but only by looking at specific sectors, indeed at particular product markets and market segments, and at specific policies and outcomes. We particularly encourage paper-givers to address the following questions:

- A. What are the specific outcomes of the new technology policies implemented since about 1998? Given the context of broad-based improvement of technology capability, where can we most clearly see the impact of specific policies? Is there clear evidence of the success or failure of innovation policy in specific sectors? More broadly, do we see evidence of a “tipping point” in the relationship between China’s domestic technology effort and its import and adaptation of technology from abroad?
- B. How does the quest for “autonomous innovation” interact with the ongoing changes in globally-open high technology production networks? Is “autonomous innovation” a substitute for, or a complement to, the global networks into which Chinese firms have become increasingly integrated during the 1990s and early 2000s? How does the integration of Chinese firms into global corporate networks affect the development of China’s innovation system and its innovative capabilities? Do changes in global production networks make it easier, or more difficult, for Chinese firms to move up the ladder of innovative capabilities, and does China’s innovation policy prepare it to reap the potential benefits?
- C. Is it possible to evaluate, in a preliminary fashion, the costs and benefits of China’s technology policies? Strategic technology policy has many benefits, and also complex and sometimes unanticipated costs. On a net basis, has China’s support for domestic standards accelerated technological upgrading in individual cases? Can we identify specific policies for which the costs incurred have produced an unusually high (or low) innovation payback?

We recognize that scholars are still at an early stage in evaluating the positives and negatives of technology policy. Clearly, some results must be preliminary. We propose to bring to San Diego a medium-sized group of some of the best scholars working on these issues, in order to bring together complementary perspectives and seeking to gain a broader perspective on China’s quest for an innovative society.