

# Proceedings of the China-India-US Workshop on Science, Technology and Innovation Policy

## Section V Session III - Information Technology

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## **Remarks by the Chair**

**Ms. Bhavya Lal**

Welcome to this session on Information Technology (IT)

I propose to open this session with a few remarks to lay the groundwork for our discussion on the IT ecology of the three nations. The context will help us all anchor what we hear in the talks that follow. I will talk about the structural changes that have occurred in the world that are enabling the forces of globalization, especially in the IT sector, to take hold. A recent National Academies report (Innovation in Global Industries: U.S. Firms Competing in a New World, By Jeffrey T. Macher and David C. Mowery, Editors, Committee on the Competitiveness and Workforce Needs of U.S. Industry, National Research Council, 2008), caught my attention recently, and I propose to highlight four trends that the report described:

- growth of innovative capabilities in a number of economies that 20 years ago were classified as poor
- growth of sophisticated manufacturing and services-production activities in these and other economies
- growth of demand for cutting-edge technologies (particularly in IT) in markets outside of the United States
- growth of “vertical specialization” in many knowledge-intensive industries

Let me explain what each means, in turn.

### **Improved Innovative Capabilities in New Regions of the Global Economy**

The first trend, as described by Macher et al, is the growth of innovative capabilities in countries such as China and India (not to forget Taiwan, South Korea and others) – countries not much involved in research and development (R&D) or product development for global markets 10-20 years ago. In some of these countries, subsidiaries of foreign firms (and now indigenous firms) are performing high quality fundamental research. In most of these firms, improvements in innovative capabilities have enhanced the ability of these countries to contribute to the design and development of advanced products, including those in service based industries such as financial services and logistics.

### **Expansion of Production Activities Outside of the United States**

A second trend is the expansion of production activities outside of the United States in these and other regions. In a number of industries, ranging from semiconductors to flat panel displays and PCs, U.S. firms rely on sites outside of the United States for a growing share of their production requirements. Much of this offshore expansion in manufacturing activity has occurred in Asia and Southeast Asia, particularly in China, Taiwan, and

South Korea. In the flat panel display industry, for example, growth in Asian production by U.S. firms and the entry into production by Asian firms have attracted many innovation-related activities to Asian sites.

### **The Changing Profile of Demand for Advanced Products in Foreign Markets**

It used to be that U.S. firms developed and introduced their most advanced products within their domestic market before marketing and (eventually) manufacturing these products offshore. This is increasingly not true anymore. Consumer markets for wireless and digital devices in countries such as South Korea, for example, are growing more rapidly than are similar markets in the United States. Consumers in these markets demand more advanced applications than is true of consumers elsewhere in the global economy. Authors of the book claim that these advanced users play a crucial role in demanding and in some cases developing new applications, as well as in logistics. Firms seeking to exploit and develop new applications for these dynamic user-driven markets typically must locate a portion of their product development and design activities within these markets.

### **Increasing “Vertical Specialization”**

In recent years, vertical specialization — or the development of an industry structure populated by firms that specialize in one or a limited set of activities who contract with other firms that specialize in different activities within the industry — has become more prevalent. For example, one group of firms in the pharmaceutical industry now focuses on drug discovery and contracts with other firms for drug development (e.g., clinical trials) and post-approval marketing. Similarly, in the semiconductors space, manufacturing “foundries” collaborate on a contractual basis with “fabless” semiconductor firms that specialize in design and marketing of semiconductor components. This type of contract-based collaboration among specialized firms differs considerably from the operations of firms that are vertically integrated in all functions ranging from R&D through manufacturing to marketing. Vertical specialization has supported the creation of (especially in the US) firms that must collaborate with offshore manufacturers – this has furthered globalization not just of these industries but also in financial services and logistics areas, areas that need to be well-developed to allow for complex international transactions to take place.

Each of the nations, the United States, China and India, have benefited (or at least been affected) by these structural changes, that I have paraphrased from the National Academies’ publication (which I highly recommend to the audience). Now we will hear about the IT ecosystems of each of these countries and how they are evolving in tandem with these change.