

September 27, 2007

China's Manufacturing Future Rests on the Development of Original Technologies

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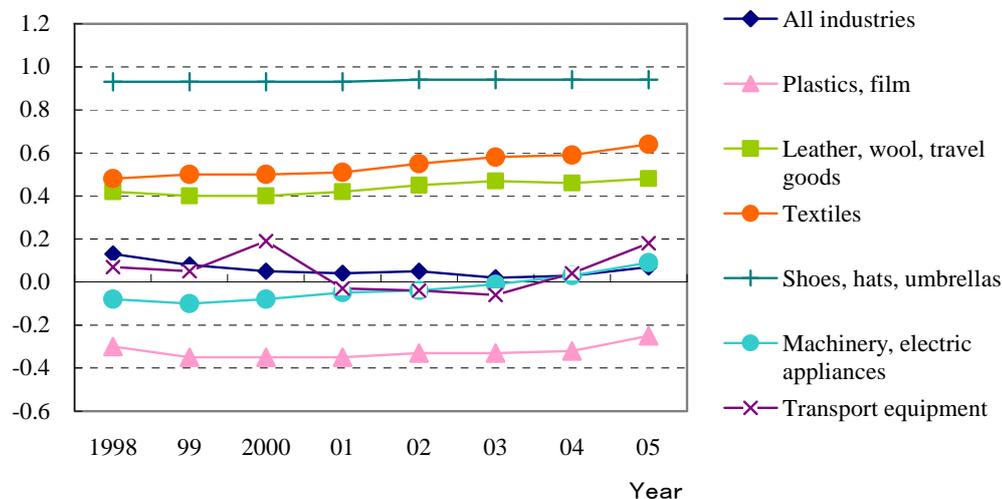
China's manufacturing industry has steadily enhanced its competitiveness through injections of foreign capital and technology, as well as the widespread adoption of modular production techniques involving the assembly of standardized modules purchased from other companies. Its primary role, though, is still mostly limited to subcontracting and assembly processing. To be able to compete on an equal footing with industrially advanced countries, it will need to develop its own technologies. It must be careful, however, not to insist too strongly on establishing a unique set of domestic technical standards, for this could isolate it from other global markets and actually dampen its competitiveness.

Growth of Electronics and Autos

Developments in the electronics, communication, and auto industries are symbolic of the current situation in China's manufacturing. According to an announcement by China's Ministry of Information Industry, sales among the country's top 100 electronics firms in fiscal 2006 increased 17% over the previous year and exceeded 1 trillion yuan (approximately 16 trillion yen) for the first time. R&D expenditures also rose by 21%, but net income declined by 4.9%—the first contraction ever recorded. This was attributed to setbacks in overseas operations and the inability to compete with companies from the industrial countries due to a lack of innovative technologies.

In the auto industry, meanwhile, two Chinese companies—the FAW (First Automobile Works) Group and Shanghai Automotive Industry Corp.—made the Fortune 500 list in 2006 for net sales. Companies without foreign capital, including Chery Automobile and Geely Automobile Holdings Ltd., have also emerged as major players and have developed their own brands and models. They have begun exporting to Europe and North America and building local production facilities, sparking arguments about a “China threat” in the United States. There are still quality problems with their finished cars, however, and the hybrid technologies being developed by both foreign-affiliated and local firms are as yet immature.

Statistics clearly corroborate these trends. The export specialization coefficient, which measures products' international competitiveness on a scale of +1 (very competitive) to -1 (uncompetitive), had been below 0 in the machinery, electrical appliance, and transport equipment categories but turned positive in 2004 and has continued to rise (Figure).

Figure Export Specialization Coefficient of China's Manufacturing Sector

Source: *China Statistical Yearbook*, 2006.

Trade statistics compiled by the US Census Bureau, meanwhile, show that America's imports of electronic and information-related products from China have been rising sharply. Between 2002 and 2006, imports rose 10.9-fold for computers, 3.1-fold for communication equipment, and 3.0-fold for semiconductors and related devices. Imports from Japan, meanwhile, rose only slightly or declined over the same period.

This does not mean, though, that Japanese products are being driven out of the US market by imports from China. The UN *International Trade Statistics Yearbook* for 2004 (published on May 31, 2007) shows that in a comparison of similar products and parts, the unit prices of Japanese products were 2 to 10 times higher than those from China. The respective products were thus highly differentiated according to added value and were targeted at different segments of the market.

Limits to Modular Production

The biggest source of China's enhanced competitiveness in international markets is the widespread adoption of modular production, which, as University of Tokyo Professor Takahiro Fujimoto explains, "can generate a broad range of products through the assembling of existing parts owing to the standardized interfaces of major components and modules." Chinese companies have not spent much time or money on the in-house production of parts, accumulation of production know-how, and human resources development. Rather they have been turning out a stream of products by relying on the capital, human resources, components, and technologies of foreign firms and by imitating foreign products and assembling generic parts. Their growth has been propelled not through the development of their own brands but through production on an OEM (original equipment manufacturing) or EMS (electronic manufacturing service) basis.

Many of these manufacturers have now come up against a wall, as they realize that the modular production approach will never enable them to overtake their foreign rivals. One reason is that they must continue to pay for the use of patented technologies; some 30% of the sales price of personal computers is paid as royalties, and for cell phones and DVD players, the figure is around 20%. Royalties must be paid even when simply putting modules together. Unless Chinese companies can come up with their own core technologies and product standards, they will never outgrow their present status as low-cost subcontractors for global firms.

The Chinese government is therefore promoting the concept of “self-innovation” and encouraging domestic industry to develop proprietary technologies. This is based on the idea that the competitiveness of Chinese firms will not rise as long as they must continue paying hefty royalties to foreign firms. The latest five-year plan (covering 2006–10) identified “self-innovation” as a national policy.

Steady Efforts

This is not to say that innovations have been lacking altogether in China; there are many examples of existing technologies being applied to meet the needs of the domestic market, but there have been few technological innovations that were embraced by the global market. There have recently been attempts to create China’s own product standards, examples being the TD-SCDMA for third-generation cell phones, the enhanced versatile disk (EVD) for next-generation DVDs, and WAPI for wireless LAN communication. There is a high likelihood that the 3G cellphone standard would be commercialized by the 2008 Olympic Games in Beijing.

Some foreign companies consider such domestic standards a threat, since they could conceivably become de facto global standards given the sheer scale of the Chinese market. Others point out, though, that insistence on maintaining one’s own standards would only isolate China from the rest of the world. In the age of globalization, it is not easy for any single country to establish standards for the entire world. For China to do so would require, first, that it develop its human resources, raise engineering levels among its manufacturers, and make steady efforts to establish standards that the entire world would be eager to embrace.

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