

OECD FORUM 2005

FUELLING THE FUTURE: Security, Stability, Development

Globalisation, Outsourcing and Structural Adjustment

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Since the 1960s, Taiwan has been an important subcontractor for original equipment manufacturers (OEMs) in Western countries. Taiwanese firms initially received the designs of OEMs and manufactured the products accordingly. In the 30 years that followed, Taiwan developed a very efficient production system to provide the so-called “OEM services.” Known for its flexibility and speed in terms of delivering the products requested by the OEM clients, this system has allowed Taiwanese subcontractors to accept small batches of orders and to deliver products within a short span of time. Within the system is an intricate network of small suppliers working closely together, each with very specialized functions.

With the advances in IT technology, the flexibility of the Taiwanese system was pushed to the extreme in the 1990s. To reduce inventory costs and cut the lead-time to markets, OEMs have asked Taiwanese subcontractors to adopt order-based production in lieu of the traditional forecast-based production. To accommodate this demand, Taiwanese subcontractors have had to reorganize their supply chains to enable a “just-in-time” production method to operate. The popular “982” scheme in the production of notebook computers, for example, has required Taiwanese subcontractors to obtain 98% of the components and parts needed for production within two days of receiving the orders, which are collected by brand marketers such as Dell and HP on the Internet and transmitted to Taiwanese subcontractors on line. The delivery is usually made within one week. The system has not only enabled the brand marketers to reduce the production costs, but has also allowed the consumers to configure their own computers on the Internet.

Beginning in the 1990s, two important trends emerged in this OEM business. One is that Taiwanese firms started to provide logistics services after manufacturing the products. The other is that Taiwanese firms started to offer product design services in addition to manufacturing. These two trends have allowed Taiwanese firms to extend their domain in the value chain and to assume a more important role in the global production networks.

The provision of logistics services includes warehousing and delivery, and sometimes even after-sales services. In the past, subcontractors only had to deliver the products to the domestic seaports or airports and the brand marketers would take the responsibility from that point onward, the point at which the subcontractors received their payment. Nowadays, the subcontractors have to deliver their products to designated sales points, and payments will not become due until the products leave the warehouses. Subcontractors also have to establish warehouses and even repair service centers in major markets in order to serve the clients. The so-called “global logistics” service capability has become a prerequisite for subcontractors to win big orders. This

redefinition of the division of labor along the value chain has been driven by the needs of brand marketers to refocus their resources on core competence and to outsource non-core activities. The pressure has arisen from an increasing degree of globalization which has intensified competition in the product markets. The redefining of these markets has forced many small subcontractors out of the OEM market and increased the degree of seller concentration in relevant industries. Those who are able to coordinate cross-border supply chains and logistics effectively act as integrated service providers whereby their position in the global production network is enhanced.¹

Electronics manufacturing services (EMS) also emerged in the 1990s in the advanced countries to compete with Taiwanese subcontractors and other subcontractors in Asia. US-based EMS firms like Solectron, Cellon, and Singapore-based Flextronics maintain factories in multiple locations, particularly in countries that Taiwanese firms have been reluctant to enter, such as those in Eastern Europe and South America, and provide global manufacturing services to a wide range of electronics products. When compared with Taiwanese subcontractors, these EMS firms are bigger, more multinational, and more diversified in terms of their product coverage. They have acquired many factories originally owned by brand marketers and have assumed the role of manufacturing responsibilities. Their presence has pushed the separation of manufacturing from product designs and marketing to an even greater extent. They command a large volume of production, from which they derive a large demand for components and parts. Using volume as their leverage, EMS firms have pushed down the prices of electronics components and parts, shrinking the profit margins of their suppliers. Compared with Taiwanese subcontractors that work within an intertwined network, EMS providers usually rely on arms-length transactions.

To counter the competition from these EMS firms, Taiwanese subcontractors have moved up the value chain to provide product designs in addition to manufacturing services. By building on their vast expertise in manufacturing, Taiwanese subcontractors offer product designs that are either easier to fabricate or have less risk of being defective. They know the materials better than their clients, and so they can choose the right inputs for the products. They also know the internal structure of their products better than their clients, so they can design products that save on engineering and manufacturing costs. However, they usually do not know their customers' tastes or the fashion trends very well, so they have less of an advantage in terms of the external design of the products or the design of the functions or characteristics of the products.

However, because of their close contacts with component suppliers, particularly the key component suppliers, they are better positioned than their clients to take advantage of the newly available technologies embodied in such components. The clients find that, by outsourcing product designs to Taiwanese subcontractors, who have started to call themselves ODMs (original design manufacturers), they can shorten the time needed for product development and hence time-to-market. The clients can then focus on formulating the concept of the new product, or making a rudimentary design, and then allow the Taiwanese ODMs to work out the prototypes. Sometimes the prototypes can be multiple, allowing the brand marketers to choose one of them for mass production. The

1. Shing-Horng Chen, Meng-Chun Liu, and Hui-Tzu Shih, 2004, "R&D Services and Global Production Networks: A Taiwanese Perspective," CIER mimeo.

advantage of such access to manufacturing-related technologies allows Taiwanese ODMs to develop a new PC notebook model in 3 months, compared to 6 months in Japan and 9 months in the US.² This advantage has also attracted many IT-related brand marketers to establish product development centers in Taiwan. For example, HP, Dell and Motorola have product development centers in Taiwan today. Business Week reported that about 20% of the world's mobile phones, 30% of its digital cameras, 65% of its notebook PCs and 70% of its PDAs are designed in Asia today.³

As a result of the increased outsourcing of product designs, brand marketers are able to bring their products to the market faster than before, which in turn, shortens the product life cycles. They can also trim their R&D costs and refocus their R&D efforts on core technologies. For example, Nokia Corp. said that it aims to trim R&D spending from 12.8% of sales in 2004 to under 10% by the end of 2006.⁴ Concomitant with this strategy shift, brand marketers are reducing their R&D spending at home and increasing R&D spending abroad. They have set up R&D laboratories and design centers in China, India, Israel, Taiwan and other areas to make use of local talent in lower-income countries. For example, both IBM and Microsoft have established laboratories in China to engage in basic research. You may think that China has a very low base of R&D knowledge, but because of intra-firm knowledge sharing, Chinese engineers can also engage in very high-end research activities. R&D activities in low-income countries are normally managed by the research team at company headquarters.

Because of the increasing need to make product designs for brand marketers, demand for highly-skilled labor has increased dramatically in countries that previously thrived on low-skilled labor, such as Taiwan. According to a government estimate, Taiwan suffers a shortage of about 10,000 skilled engineers each year despite the fact that Taiwan has one of the largest numbers of college graduates in the disciplines of science and technology. This shortage of skilled-labor has also forced Taiwanese firms to source their R&D from China. According to one survey, 40.23% of Taiwanese subsidiaries in China conducted some R&D activities in China, although most of these activities were known to be performed in the Chinese subsidiaries.⁵ Usually the division of labor between Taiwan and China is as follows: Taiwan focuses on hardware designs, while China focuses on software designs, or Taiwan focuses on product designs while China focuses on specific functions that are to be integrated into the products. There are also cases where Taiwan handles the product designs while China engages in manufacturing-related R&D and provides engineering support. In the latter cases, R&D and manufacturing are de-linked.⁶

As more and more Taiwanese firms move up the value-chain to product development, or down the value chain to logistics services, an increasing proportion of Taiwanese manufacturing services is being farmed out to China. This is manifested in the proportion of export orders that are processed abroad. According to government statistics, 33.2% of export orders received by Taiwanese firms were actually fulfilled by offshore manufacturing units in 2004. Of all industries, the IT industry had the highest proportion

2. Interview with Quanta Electronics, November 15 2004.

3. "Outsourcing Innovation," *Business Week*, March 21, 2005.

4. *ibid.*

5. Meng-Chun Liu, 2004, *Survey Report on Taiwanese Firms Operating in China*, CIER project report.

6. Chen, Liu & Shih (2004).

of 62.1%, and of all the offshore export platforms, China was known to be the important source of supply.⁷

As a subcontractor to international brand marketers, Taiwan gained ready access to international markets. Without much of a technology base and by owning virtually no marketing channels, Taiwanese firms were able to integrate themselves into the global production system in the 1960s. This allowed Taiwan to exploit its abundance of unskilled labor in order to benefit from trade. Taiwanese firms produced many labor-intensive products, ranging from clothing to aircraft parts, that were sold in international markets in the names of their clients. By adopting this process, Taiwan strengthened its technology base and raised its per-capita income. To accommodate the role of a “global factory,” Taiwan devoted a large proportion of its educational resources to preparing technicians and engineers for its manufacturing industry. At the high-school level, for example, 70% of the students were engaged in vocational training and only 30% took regular high-school courses in preparation for a college education. The motto for Taiwanese industries was “low cost, high quality”. Few firms aspired to R&D and innovation.

In the ODM era, however, things were different. Taiwanese firms started to spend more on R&D. In 2003, R&D spending accounted for 2.3% of GDP. Some major ODM players employ a large fleet of R&D staff that rivals their clients. For example, the biggest ODM firm in the notebook PC industry, Quanta, is said to have 7,000 R&D staff. The strong demand for skilled workers, which is backed up by good salaries and lucrative bonuses, has enticed many young college graduates to join the industry right after graduation. Unlike the older generations who liked to go overseas to the Western countries for advanced studies, the “brain drain” is no longer a problem. In fact, most expatriates returned to Taiwan in the 1990s, which constituted the “reverse brain drain.” Although most of the R&D efforts of Taiwanese firms are still concentrated on process technologies, this is expected to change in the future. Meanwhile, as a result of outsourcing labor-intensive production to China and Southeast Asian countries, there are apparent job losses for unskilled workers in Taiwan. The unemployment rate has risen above 5% in recent years, and low-skilled workers in the manufacturing sector have a high likelihood of being laid off.

In fact, the mismatch between labor demand and labor supply in terms of skills is most troublesome in this new age of outsourcing. Low-skilled workers are hard-pressed to find a job in Taiwan. Even if they go to China where labor-intensive industries are booming, they have to compete with an incredibly large army of unemployed workers for scarce job opportunities. On the other hand, highly-skilled workers are in short supply. Even if corporations go to China to recruit, they find themselves competing with many well-known multinationals for Chinese talent which is also in short supply.

Outsourcing for offshore skills defuses the old problem of the “brain drain.” In the cases where the brain drain applies, low-income countries lose their top talent to high-income countries and this therefore slows down their human-capital accumulation. Conversely, high-income countries take advantage of the top talent of the low-income countries to

7. The data are obtained from the Department of Statistics, Ministry of Economic Affairs. The data are August figures.

speed up their human-capital accumulation. These two opposing trends exacerbate the North-South income gap. With the outsourcing of overseas skills, those with the best brains remain in low-income countries, allowing them to retain the opportunity to build up a local knowledge base. This helps reduce the income gap between North and South. Outsourcing therefore makes the world more equitable at the national level.

However, outsourcing also makes the income distribution within a nation less equitable. This is because highly-skilled workers, which are in short supply to begin with, face a world-wide demand while low-skilled workers are confined to local markets. The productivity of highly-skilled workers in low-income countries is enhanced by the support of knowledge and skills which are available only in the most advanced multinational corporations. The productivity of low-skilled workers can only be helped by foreign direct investment (FDI), which usually brings with it outmoded technologies. FDI is also foot-loose and may flee the country once the surplus of low-skilled workers in the host country disappears. The asymmetric effects of outsourcing and FDI will enlarge the income disparity between highly-skilled and low-skilled workers in developing countries. The impact of outsourcing on the source country is less clear, however. On the one hand, outsourcing takes away job opportunities from skilled workers at home, but on the other hand it also increases the productivity of skilled workers who remain on the job.