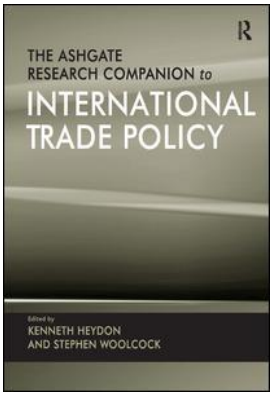

The Ashgate Research Companion To International Trade Policy

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Changes in the Value Chain of Manufacturing Industries: A Japanese Perspective

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Changes in the Value Chain of Manufacturing Industries: A Japanese Perspective

Risaburo Nezu

Introduction

This chapter examines, from a Japanese perspective, the key trends that have come to dominate global production and trade in manufactures. The first section briefly addresses the relative decline in manufacturing within the developed economies. The second section examines the contrasting experience of Japan in two key sectors – the vertically integrated automobile sector and the horizontally fragmented electronics industry. The third section highlights some keys to success in the global value chain. The fourth section touches on a number of future challenges likely to be faced by global manufacturing activity. The fifth section concludes.

Declining Manufacturing Industry in Developed Countries

Over a long period of time, manufacturing sectors have lost their relative importance in the economies of developed countries (see Figure 10.1). The proportion of manufacturing sectors, measured as the ratio of value added to gross domestic product (GDP), shows steady declining trends, although such declines are more pronounced in the two Anglo-Saxon countries, the United Kingdom and the United States, while in Germany and Japan there seems to be some flattening in the second half of the last decade until the international financial crisis of 2008.

However, this crisis hit the manufacturing sector even harder than the financial sector, which was the epicentre of the crisis. Some industrial sectors, particularly automotive and consumer electronics, experienced a contraction in production levels by some 40 per cent to 50 per cent. Judging by massive plant closures during the past two years and modest economic growth recovery prospects of developed

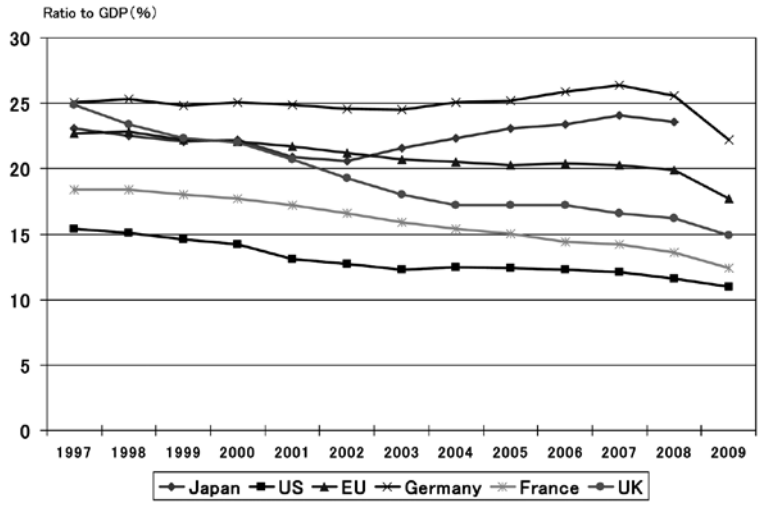

Figure 10.1 Share of manufacturing in most industrialized countries
Source: OECD, Eurostat, USDOC.

countries, it is highly likely that these manufacturing sectors in developed countries will never return to the pre-crisis level of production. Expansion of markets for these sectors will be largely in the emerging economies. In terms of employment, this decline of the manufacturing sector is even more noticeable (see Figure 10.2).

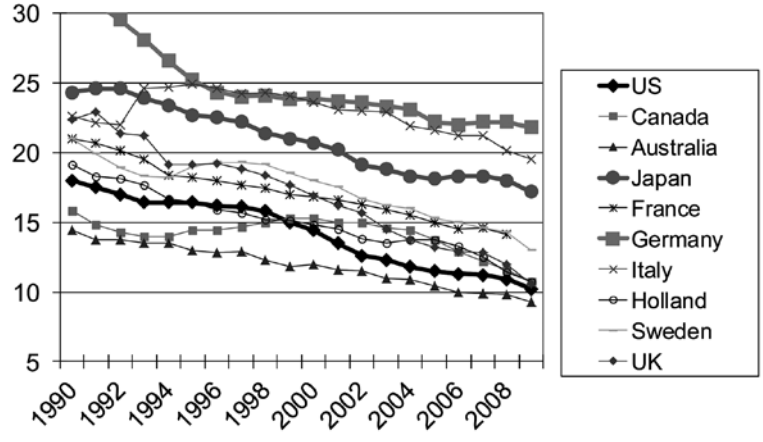

Figure 10.2 Share of manufacturing sectors in employment
Source: US Bureau of Labor Statistics.

In Organization for Economic Cooperation and Development (OECD) countries, proportions of employment in manufacturing sectors have followed straight lines of decline almost without exception. Even Germany, which identifies itself as the industrial base of Europe, could not escape this trend.

Due to this relative contraction of manufacturing industries in the OECD economies, and also due to the sharp rise in manufacturing in the emerging economies, the combined share of the United States, EU and Japan has declined, although the European Union (EU) has suffered a relatively smaller decline (see Figure 10.3).

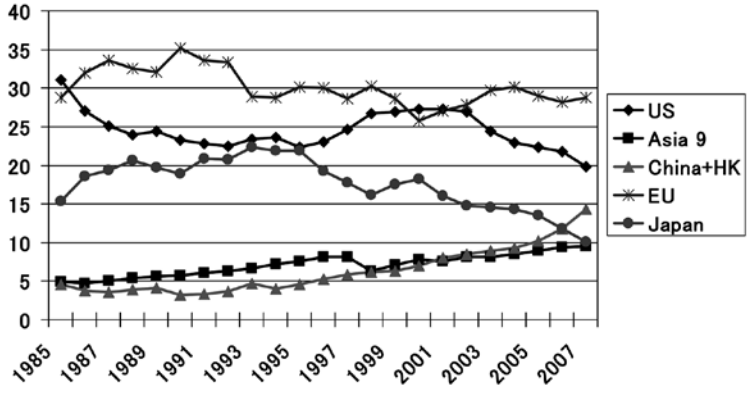

Figure 10.3 Share of major countries in global manufacturing sectors
Source: Produced by the Fujitsu Research Institute based on the US National Science Foundation database.

This is perhaps due to relocation of plants and factories to the former Eastern European area that is now a part of the EU. During this period, emerging Asian countries have gained greater proportions of the global manufacturing pie. This relative expansion and contraction of manufacturing sectors can be confirmed by comparing GDP and the index of industrial production (IIP) of individual countries. GDP helps to measure the growth rate of the economic activity of the total economy, while IIP tracks only the manufacturing sector. In most OECD countries, the growth rate of IIP is slightly lower than real GDP, while in emerging Asian economies, the opposite is the case (see Figure 10.4).

This shift to emerging economies seems to be following a well-known pattern of how multinational companies shift their production sites to developing countries according to the theory of the product life cycle proposed by Vernon (1971). The shift started with labour-intensive, mature industries like textiles, garments, shoes and toys which by now have disappeared from most OECD countries, except for some high quality brands. Steel and material industries have also moved offshore.

	US		Japan		EU15		China		India		Korea	
	Real GDP	IIP	Real GDP	IIP	Real GDP	IIP	Real GDP	IIP	Real GDP	IIP	Real GDP	IIP
2005	3.1	3.9	1.9	1.3	1.8	1.2	11.3	16.4	9.5	8.2	4	6.4
2006	2.7	2.4	2	4.3	3.1	4.1	12.7	16.6	9.7	11.6	5.2	8.4
2007	2.1	3	2.4	3	2.7	3.5	14.2	18.5	9.2	8.5	5.1	6.9
2008	0.4	-4.5	-1.2	-3.4	0.5	-1.8	9.6	12.9	6.7	2.8	2.3	3.4
2009	-2.4	-11	-5.2	-21.9	-4.1	-13.9	9.1	11	7.4	10.5	0.2	-0.8
Average	1.2	-1.2	0	-3.3	0.8	-1.4	11.4	15.1	8.5	8.3	3.4	4.9

Figure 10.4 Changes of GDP and IIP for major countries
Source: OECD Economic Outlook, CEIC database.

Production of capital goods, such as machine tools, robotics and construction equipment are moving more slowly due to the high level of technology content, lack of skilled workers in the developing world to operate plants and factories, and high capital costs in these sectors. But even in these sectors, most capacity expansions are seen in non-OECD countries.

Broad Trends in Manufacturing Production and Trade: A Comparison Between Automotives and Electronics

Accelerating Offshore Shift after the Global Financial Crisis of 2008

Shifts in manufacturing to the developing world are accelerating in the wake of the global financial crisis of 2008. Although the global economy, including OECD countries, recovered more quickly in 2009 than at first feared, it never reached the pre-crisis level of production. Major contraction is still continuing in automotive and consumer electronics. The case of General Motors (GM) in the United States testifies to the magnitude of such movements. After years of poor performance, GM went bankrupt and came back to the stock market only in November 2010. During the period of government ownership, the company closed ten factories in North America, sold out a number of product lines and brands and laid off tens of thousands of workers. At the same time, the company invested heavily in China,

which has become the biggest automobile market in the world. In Europe, since late last century, major automobile companies like Fiat and Volkswagen have closed factories at home and moved their plants to Eastern Europe. In the electronics industry, Philips and Siemens have either terminated production of consumer goods like audiovisual products, let alone white goods, or are moving their production base to emerging countries. At home, they are now concentrating their resources on medical technology, environmental equipment and infrastructure businesses.[1]

However, it is important to note that while OECD countries are losing their share to emerging countries in the conventional industrial sectors, they are successfully maintaining their positions in the high-tech areas, composed of information and communication equipment, biotech, aerospace and precision measurement equipment. As Figure 10.5 shows, the combined world market share of the United States and EU has remained at around 60 per cent over the last ten years. And there seems to be no sign of weakness. Here, the high-tech industry is characterized by the OECD having a high ratio of research and development (R&D) expenditure to sales. The only exception is Japan, which has lost its position to China. This happened because Japan poured vast amounts of several resources into information and communication technology (ICT) and failed to establish a stronghold in other high-tech sectors. China could erode the dominant position of Japan by attracting foreign direct investments from US and European ICT companies.

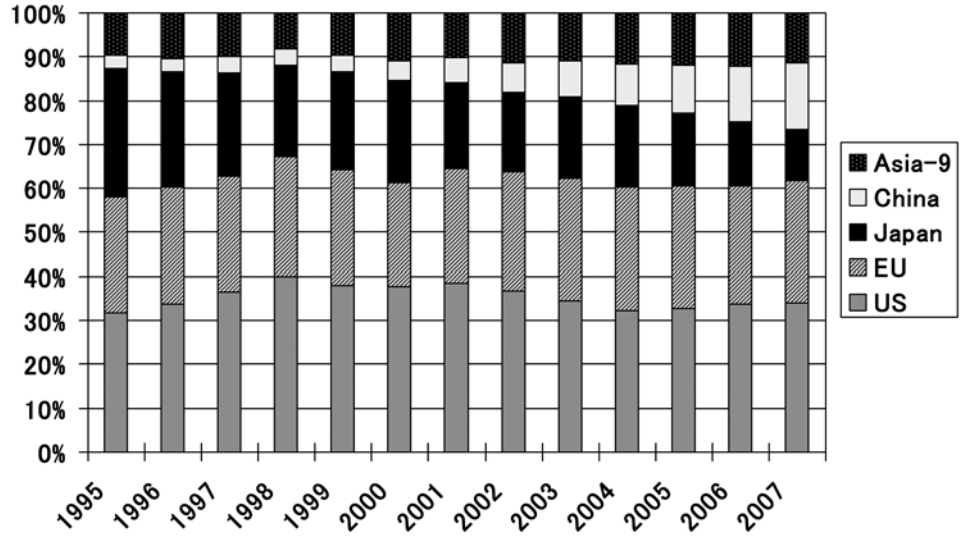

Figure 10.5 Shares of world production for the high-tech industry
Note: High-tech refers to ICT, biotech, aerospace, precision measurement equipment.
Source: Created by FRI based on National Science Foundation data.

[1] Annual reports of Siemens and Philips (2008, 2009, 2010).

A similar decline in competitiveness is evident in Japan's share of world exports, which has slipped from 8 per cent in 1995 to 4 per cent at present. While this downward trend is inevitable to some extent given the increasing roles of China and other newly emerging Asian economies, the problem is the rate of decline, which is fast even compared to that of Germany or the United States. The major factors which explain this rapid shrinkage of Japanese industry are to be found in two key industrial sectors, automotive and electronics. These sectors used to be the main driving force behind Japanese economic growth.

The nature of the problems faced by these two sectors differs fundamentally. Japanese automobile companies have retained their positions as global leaders, by relocating their factories and reorganizing their supply chains on a global scale. In contrast, the electronics industry has not been able to transform its value chain globally in a timely fashion and accordingly has lost its competitive position.

The Automotive Story – Shifting Vertically Integrated Factories to Emerging Countries

The automotive industry is a mature sector, with a history of more than 100 years since the first commercialization of the car in Europe. The key concepts of a vehicle, which consists of an internal combustion engine, wheels and a transmission, are all mature technologies. Innovations go in a continuous manner at a constant speed (Fujimoto 2002; Tanaka 2009). In this environment, Japanese companies have developed unique production methods like the *kaizen* (continuous improvement) quality control circle, or what is known more broadly as 'lean production' (Womack and Jones 1992). Another success factor for the Japanese auto industry has been its insistence on energy efficiency. Originally, efficiency was a domestic concern for Japanese consumers, as gasoline prices were higher in Japan and air pollution was an acute problem. The oil crises in the 1970s, which quadrupled crude oil prices, made Japanese cars the most preferred cars in the world.

At first, Japanese auto companies responded to this situation only by increasing exports, but this strategy soon proved to be a major cause of trade friction with the United States and Europe. Under pressure from the governments of Japan, the United States and Europe, Japanese companies decided to produce in the host countries in order to create jobs there. Such overseas production came much later than that of their European and US counterparts, because initially the Japanese companies were not sure if the Japanese way of production would be possible on foreign soil. They moved cautiously at first, then more boldly in subsequent years. This was the starting point of a long process of creating a global value chain. In order to maintain high quality and a lean production system, Japanese companies maintained close relations with their parts and components suppliers in Japan, with whom the assemblers had shared experience and know-how for several years. They maintained a vertically integrated production system, which enabled them to fine-tune and coordinate hundreds of thousands of parts and components. There was outside criticism that Japanese companies had exclusive buyer–supplier

relations and were refusing to buy from local suppliers, but there is no denying that these long-term relationships were the key to the success of the Japanese auto industry (Fujimoto 2002).

This cohesive relationship between auto assemblers and parts suppliers came to a sudden turning point in 1999, when Nissan, the second-largest auto company in Japan, was acquired by Renault. In order to reduce costs, Carlos Ghosn, the newly appointed chief executive of Nissan, decided to change the company's long-standing policy to buy only from its affiliated suppliers and began to purchase from open sources at more competitive prices. Other companies began to move in the same direction, albeit more cautiously. Thus, the vertically integrated *keiretsu* system began to unwind. But such unwinding never went as far as seen in the electronics sector. In car-making, each part and component must be carefully fine-tuned and tailored to fit the others. It is not like buying products at a supermarket.

The Successful Japanese Automotive Industry and Hollowing Out of the Japanese Industrial Base

During the 1990s, Japanese auto companies built more factories abroad, at first in the United States and Europe, then in neighbouring Asian countries. During this period, overseas production consistently increased until the global financial crisis of 2008. With time, Japanese auto companies learned how to apply the Japanese way of producing automobiles abroad, namely lean production. More companies began to adopt the policy of building their cars where there is demand. Their domestic production declined from 14 million vehicles in 1990, to less than ten million in 2009. But overseas production, which started from scratch 30 years ago, now surpasses domestic production. The number of workers employed in the automotive industry in Japan decreased from 956,000 in 1991 to 787,000 in 2002. Japanese companies now employ more than one million workers outside Japan.

At the same time, such moves boosted exports of parts and intermediaries from Japan, leaving an important part of the value chain at home. This export of parts is now gradually being replaced by local or third country production which raises the ratio of local procurements even higher. But, because of the rapidly expanding local production of cars in Asia, the overall export of parts from Japan is steadily increasing, with a positive effect on the balance of Japan's international payments.

The Agony of the Japanese Electronics Industry – a Case of Horizontal Fragmentation of the Value Chain

In recent years, the Japanese electronics industry, once the overwhelming global leader, has been faced with serious structural and strategic problems. Unlike the automotive industry, this industry has undergone a fundamental shift from analogue to digital technology. In particular, the advent of the Internet has forced

many existing electronics companies to leave the market, making way for entirely new venture-type companies (Sato 2006).

Regardless of the country or industry, it is generally correct to say that successful companies tend to be bound by existing methods of production and can move only slowly to take advantage of new technologies. In the information technology (IT) sector, composed of such technologies as semiconductors, personal computers, mobile telephones, software and computer solutions businesses, Japanese companies like Sony, Hitachi, Toshiba, Matsushita and Fujitsu lost their international competitive edge and were forced to retreat to the domestic market. They did not lose to the existing foreign firms, however, but rather to new companies like Microsoft, Dell, Cisco Systems, Apple and Oracle. These companies all started up during the 1980s, except for Microsoft which was founded in 1977. Google was founded in 1998 but, within less than ten years, it became the largest search engine company in the world. In Japan, such young entrepreneurs were non-existent. Instead, the new challenge fell on the shoulders of old but large companies. Of course, these large companies were fully aware of the magnitude of the impact of digital technology, particularly the Internet. Many taskforces were created and serious efforts were made to bring this technology to the market. But these companies were slow, bureaucratic and averse to risk. In the end they lost out not only to the young US companies, but to strategically focused Korean and Taiwanese companies as well.

Concern over Japan's industrial competitiveness is mounting. Particularly in the electronics industry, including the Japanese mainstay of consumer electronics, losing world share in a succession of product areas to Korean and Chinese firms is increasing pressure on the government to present some solid solutions in its growth strategy. An oft-raised example is Korea's Samsung Electronics which, up until 20 years ago, was regarded as incapable of anything more than imitating Japanese firms. Now, Samsung dominates those same firms in high-tech areas such as semiconductors, flat-panel TVs and mobile phones (Noguchi 2010; Sato 2006).

The situation in Japan for electronics and electrical machinery is dire. Japanese firms suffered across the board in the 1990s, in some cases because they had the wrong corporate strategies and in others because they were unable to take effective steps when their strategies became outmoded in the face of change. These changes were epitomized by the IT industry. The 1990s saw a string of changes that profoundly affected corporate strategy: digitalization, downsizing and horizontal specialization. For example, mainframe computers gave way to personal computers, the core parts of which are chips called microprocessing units (MPU), and the software which runs on these operating systems (OS). Japanese and US firms both picked up on personal computers at virtually the same time, with all firms initially making proprietary models. In the United States, however, IBM decided to stop producing complete units in-house and instead outsourced MPU production to the chip company Intel and OS production to Microsoft, which were at the time almost completely unknown venture firms. IBM's performance subsequently suffered almost to the point of bankruptcy, but the firm succeeded in rehabilitating itself by shifting its business focus. The cause of Japanese firms' apparent inability to

turn their technologies into successful business was essentially structural. Venture firms and new companies that have nothing to lose are conversely much better at developing and commercializing new products.

Intel and Microsoft ended up virtually monopolizing the rapidly growing personal computer market. Particularly, as computers came to be used for access to the Internet, international connectivity became critical, and because only Intel and Microsoft products provided this, Japanese firms were obliged to sell computers containing 'Wintel' (Windows and Intel) elements, with Japanese computers per se disappearing from the market. Computers are obviously composed of more than just MPUs and OSs, but because memory chips and other small parts are easily manufactured, these markets were captured by firms in Korea and Taiwan where wages were low. The same thing happened with routers and mobile phones, the other Internet 'switching systems'. Japanese firms had all their parts made in-house or by their affiliates, and not one became a strategic Wintel-style company using a focus on core competencies to monopolize world markets in a particular part of the value chain.

Some Keys to Success in the Global Value Chain

The Challenge of Destructive Technology

Digital technology is a completely new field, previously unseen in the commercial business of electronics production. Nobuyuki Idei, former chief executive of Sony, once said, 'The Internet came like a meteorite' (Idei 2002), like that which eliminated the dinosaur from the earth 65 million years ago. It is a typical destructive innovation that presents a major break from earlier technologies. Many Japanese IT companies with a broad business domain found it difficult to take on the challenges as the new technology would cannibalize existing business. This is the typical situation which Christensen (2003) called the innovators' dilemma. Samsung, on the other hand, chose to specialize in a simple memory chip technology: dynamic random access memory, or DRAM. Japanese firms also had outstanding DRAM technologies, but overcrowding in the domestic market prevented individual firms from achieving the scale necessary to bring down costs sufficiently. In addition, because firms used their chips in their end products – consumer electronics – rather than selling them on the open market, unit prices crept up. Operated by its founder, Samsung took a bold decision to make massive capital investments at the right moment so that it was positioned to seize markets ahead of Japanese firms during periods of economic expansion. Capital investment by Japanese firms was always too little, too late, causing them to gradually fall behind. With fierce price competition from Korean and Taiwanese firms stripping away profits, almost all major Japanese electronics companies eventually withdrew from the market with the exception of Elpeda, a dedicated

memory chip manufacturer. It is often said today that 'Japanese companies won technology competition, but lost market competition' (Seno 2009).

Winning a Global Standard

Japanese problems with mobile phones point to yet another challenge. Mobile phones penetrated faster in Japan than anywhere else in the world. Telecommunications connectivity depends on common technical standards. NTT, the biggest Japanese telephone operator, led the way in developing the world's most advanced technical standard. In Europe, meanwhile, the realization that individual national standards would limit market scale saw Global System for Mobile Communications (GSM) created as a single European standard and efforts were made to have this adopted internationally. The GSM drive was spearheaded by Northern Europe and the United Kingdom. Japanese firms, however, appear to have believed that they should first control Japan's massive domestic market of 100 million people, and then it would be possible to capture the global market. Japanese firms underestimated the strategic importance of capturing the world standard. As a result, most countries, including those in Asia, adopted GSM as their technical standard, leaving Japanese mobile phones effectively trapped at home. Conversely, because GSM phones cannot be used in Japan, Japan has become one of the world's most isolated and inconvenient markets – the so-called Galapagos phenomenon (Nomura Research Institute 2008). With ten manufacturers vying for Japan's limited market, the production volume for each company cannot go much above ten million units. On the world market, Finland's Nokia alone produces 300 million units a year. Naturally, most of these units are made in Asia where labour costs are low, so Japanese firms cannot compete on price. Defeated on mobile phones too by global firms such as Nokia and Samsung, Japanese firms have vanished from the world market. The chips in mobile phones are made by US firms such as Qualcomm and Texas Instruments, which design the chips themselves but outsource production to Asian firms. US and Asian firms are thus prospering from a pattern of specialization that plays to their respective strengths. Dividing up among different companies the various stages of the production process, from development through to sales and after-sales service, is known as horizontal fragmentation, and US and Asian firms' active pursuit of this is boosting their competitiveness. In the case of Japanese firms, however, their desire to do everything in-house seems to obstruct the development of relationships whereby each firm focuses on its own core competencies and teams up with other firms for everything else. Out of 1.2 billion units produced in 2008 across the world, only 3 per cent of mobile handsets are produced by Japanese makers for Japanese domestic users.

The Power of Modularity

A key concept in understanding the difference between horizontal fragmentation and vertical integration is modularity. This concept is introduced in the book Design Rules by Baldwin and Clark (2000: 6), who state:

> At the level of engineering design, computers proved amenable to an approach we call 'modularity in design'. Under this approach, different parts of the computer could be designed by separate, specialized groups working independently of one another. The 'modules' could then be connected and (in theory at least) would function seamlessly, as long as they conform to a predetermined set of design rules.

This is precisely what happened in the 1990s to the global electronics industry with such force that it altered the landscape of the industry fundamentally. The key to the success of this module approach is that design rules are predetermined and made accessible to anyone who wishes to produce certain parts to be connected with other parts and modules. Both Intel and Microsoft made public their interfaces, enabling any potential supplier to produce parts that can work with them. The earlier mentioned GSM and the Transmission Control Protocol/Internet Protocol (TCP/IP) are yet other examples of such design rules. This opened doors for young specialized venture companies to enter into the computer business. This is the primary reason why in the computer and telecommunications industries there were so many new start-up companies.

This module approach did not occur in the automotive industry to the same extent as in electronics. Individual modules could not be produced without consideration of other modules. There is a need for close coordination and fine-tuning among producers of different modules. This makes it impossible for an assembler to buy parts from independent suppliers. While Japanese automobile companies are well known for their long-term relationships with their suppliers, more or less the same relations exist in the American and European automotive industries. Assemblers buy from a limited number of suppliers with whom they have long-term relations. Unlike with electronics, there is no entry into the automotive industries of OECD countries.

A Focus on Parts and Raw Materials

While electronics and electrical machinery manufacturers might have lost out on finished products, many Japanese companies are in fact doing well in the less visible areas of parts and raw materials. For example, Japanese companies dominate the markets for small parts such as the condensers and small motors that turn the hard disk drives in computers. With raw materials, too, Japanese firms have an

overwhelming presence in the centipede-like lead frames and silicon wafers on which chips are built and the glass substrate and chemical surface coating for flat-panel TVs. Looking at industrial sectors in what were previously described as sunset industries – chemicals and ceramics, for example – firms have been working quietly to develop products and improve quality, earning the trust of their clients. These are sectors where new Asian firms have barely ventured. In Korea, electronics firms like Samsung and LG have grown successfully, but the more their sales rise, the more exports of raw materials from Japan to Korea also increase, with Korea's deficit to Japan failing to diminish at all. In that sense, Japanese and Korean firms have established a good pattern of specialization and collaboration.

Even steel, the archetypal materials industry, is doing unexpectedly well. Since the 1970s, resource constraints and environmental problems have caused the steel industry to be viewed as a sunset industry. In fact, production levels continued to fall throughout the 1980s and 1990s, and all steel firms started exploring avenues other than steel, but most of these ventures ended in failure. Together with steel itself, however, auto steel exports and exports to Southeast Asia have been growing since 2000, while production levels have bounced back to above 100 million tonnes per annum. There have been no major technological breakthroughs, however, in recent years; Japanese firms have managed to maintain their competitiveness through a string of small efforts such as cutting personnel costs, boosting product quality and reducing energy consumption to meet customer demands.

Trade in Technology

Technology trade is an important subset of global value chains, where Japan has reason to be optimistic. The net receipt of technology trade, that is export minus import of technology, turned to surplus for Japan in the 1990s, but the surplus has constantly widened since then. This comprises fees from patent licensing, royalties, technical service, software programming and information processing. In 2008, Japanese export of such services was 2.2 trillion yen while its payment was 0.6 trillion yen, with a net surplus of 1.6 trillion yen (nearly US$16 billion) in technology trade. This is a rather small amount relative to Japan's GDP, but it is the second-largest surplus in the world after the United States, whose surplus was US$37 billion. The UK ranks more or less the same as Japan, but Germany is a distant fourth in this ranking. About 70 per cent of technology export is undertaken by the overseas subsidiaries of Japanese companies. The automotive industry plays the most important role in this technology export. This surplus of technology trade will continue to grow as more and more Japanese companies move their factories abroad and more of them regard R&D as an independent business domain rather than a subsidiary to manufacturing.

The Smile Curve as a Useful Means to Understanding Value Chains

It is generally believed that the concept of the smile curve was first proposed by Stan Shih, chief executive of Acer, a personal computer manufacturer in Taiwan, to explain the structure of the value chain for a personal computer. But this concept seems applicable to many other IT products. As shown in Figure 10.6, if we plot different stages of production on a horizontal axis, starting with R&D, key parts and essential materials, to be followed by assembly, sales and after-sales service, and then plot value-added on a vertical axis, we get a curve high at either end but low in the middle. Hence the term 'smile curve'.

In the case of personal computers, the lion's share of the profit goes to R&D and after-sales service, leaving very little for assemblers to take.

In semiconductors, there are companies like Qualcom and Texas Instruments which concentrate on researching and developing new semiconductors, but do not produce anything themselves. Experts call such companies 'fabless', which means 'without fabrication'. They draw up blueprints and circuit designs, but contract out manufacturing to Asian producers such as Taiwan Semiconductor Manufacturing Company (TSMC), the largest maker of semiconductors in the world. Such contract manufacturers can also make reasonable profit if they can maintain large scale operations and a high rate of capacity utilization. Taiwanese manufactures have been successful in this regard.

The cost structure of iPods resembles that of personal computers. As is shown in Figure 10.7, a large proportion of the price is profit for Apple and its distribution network. Another important part is the hard disk drive, which takes a quarter of the entire value. Only one-fifth of the price goes to all other remaining parts, and assembly gets almost nothing. Clearly the most profitable parts of the value chain

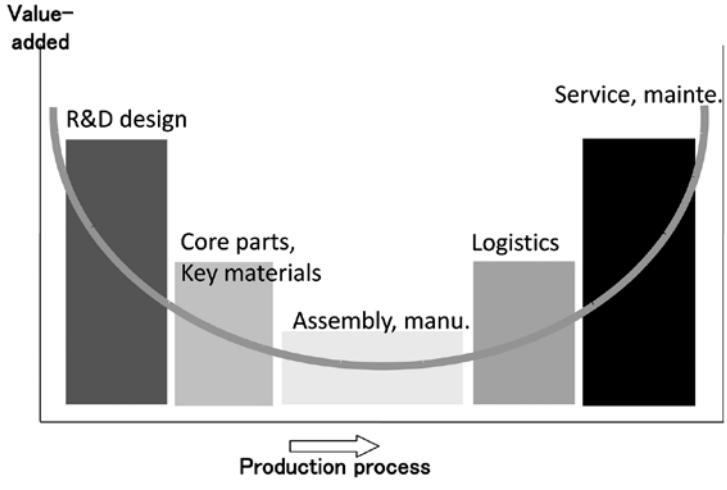

Figure 10.6 Value chain of manufacturing industry

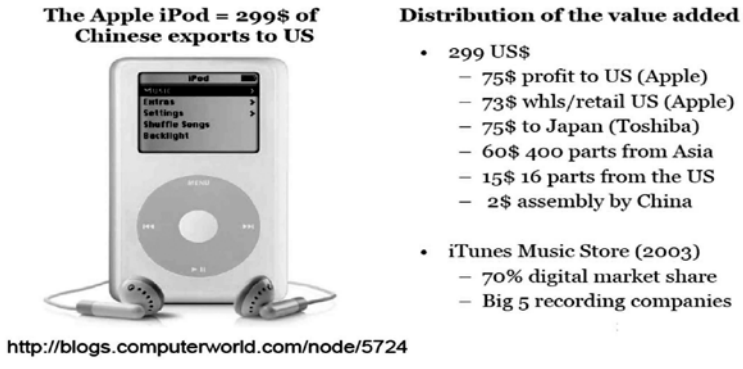

Figure 10.7 Who really makes money on the iPod?

are the R&D and design stage and the retail shops, which are at the far end of the chain. None of the hardware inside the iPod, which is all easily available on open markets, is of particular value. The flash memory chip is made by Samsung; the stainless body frame is manufactured by a small company in a remote village of Japan. There is not much that Apple fabricates, as far as hardware is concerned. What makes the iPod different from other handsets is its design and the services made available on it, and this is what creates value for iPods. Its distribution channel also provides unique product-attraction and satisfaction to customers.

Smile curves exist in sectors other than IT. Uniqlo, a Japanese clothing retail shop, is another example where the value chain looks like a smile curve. In Japan, the company focuses on designing inexpensive, but still fashionable, casual clothes, as well as running fancy retail shops. The company concentrates on producing in countries where the labour cost is lowest, like China, but more recently Cambodia and Bangladesh. One of the defining features of the company is its capacity to maintain high quality through rigorous training of workers and tight quality control even in countries where worker skills are low. The speed with which they bring new designs to the market is another factor of the company's success. Its outlets are located at the best sites in large cities or in wealthy residential areas.

Some Future Challenges and Opportunities

Electric Vehicles: Threat or Opportunity for the Auto Industry?

Returning to cars, among Japanese firms Toyota has stood out for its insistence on Japanese-style skilled manufacturing. While there remains some concern as

to whether this style can be competitive in offshore markets, overall the Japanese auto industry appears to have globalized successfully. The challenge lies ahead. There is no doubt that Asia will be the growth market in the future, but no matter how much Asia is growing, its income level is still a tenth of Japan's. One strategy would be to target the extremely rich segment of the population, but looking at the market as a whole, firms need to make cars commensurate with overall Asian income levels. In other words, 200,000–300,000 yen per car, compared with two million to three million yen in Japan. This will not be achieved through any mere cost-cutting exercise, and may well require transformation of the entire value chain. The experience and know-how accumulated to date will be of very little help. Competition will begin from a blank slate. What worries Japanese automotive experts is that the rise in environmental problems could trigger a shift from gasoline-driven cars to electronic vehicles, which will encourage the same kind of horizontal specialization and international collaboration that has occurred in the electronics industry, leaving Japanese firms out in the cold again. It is said that making an electronic car is possible for anyone with a motor and a battery, both of which are readily available on the market. Many electric vehicle ventures are emerging in the United States, and it is even possible that currently unknown venture firms may be the world's biggest auto firms in ten years' time.

Infrastructure Business as the New Growth Industry

The 'Lehman shock' in the fall of 2008 clearly brought to light the weakness of Japan's industrial structure. In other words, a narrow focus on selling consumer durables such as cars and consumer electronics to developed-country markets has its limits because it leaves firms extremely vulnerable to economic fluctuations. These two industrial sectors follow very different paradigms, but they have a lot in common: they both involve the mass production of standardized products and companies' competitiveness is determined by their ability to produce a large number of the same product as speedily as possible with the least variance in quality. This type of industry is prone to price competition with low-cost countries.

Attention has instead shifted to the so-called infrastructure business – water, power and transport. Profits in this type of business are recovered over a long 20–30 year timeframe, but with the promise of long-term, stable revenues. At the same time, the long recovery period, the sheer amount of capital involved, and the involvement of host country governments place infrastructure businesses beyond purely private sector means; state support is vital. Further, while Japanese firms have strong individual technologies, their poor overall project management capacity causes them to miss out on projects. In particular, most firms that are engaged in telephone, power, railway or water supply businesses in Japan enjoy a virtual state-run monopoly at home and have little experience or even interest in operating offshore. Consequently, they are not capable of any immediate offshore expansion. However, if these companies with their many skilled engineers and the pent-up energy derived from confinement in a saturated domestic market

could be skillfully guided, they too could find new growth opportunities offshore. Ironically, since the change of administration in 2009 from the Liberal Democratic Party to the Democratic Party of Japan, bureaucrats have begun moving actively to capture this kind of infrastructure business. In France and Germany, the state became actively involved in infrastructure businesses from a very early point, and China and Korea too have recently been strengthening moves in this direction. Japan was once described as 'Japan, Inc.' and variously praised or criticized for its cooperative government–business relationship. Since the 1980s, however, the government has become increasingly inclined to stay out of private sector marketing efforts and has consequently neglected to back private sector business. Now it seems that the government will again be playing a more active role. From the viewpoint of value chains, this is yet another attempt by Japan to reap more value from the downstream of the value chain, namely operating, maintaining and running total infrastructure systems through such activities as collecting tolls from highways, running trains on railroads and supplying water. Such total operation of infrastructure is far more profitable than just selling steel bars and concrete, trains, pumps, pipes and power generators. In order to be successful in infrastructure businesses, however, a holistic project management capacity is called for. Whether Japan has it or not is yet to be tested.

Preferential Trade Agreements: A Springboard for Asia-wide Value Chains

Since the turn of the century, Asian economies have begun to be deeply integrated by bilateral or regional preferential trade agreements (PTAs). This development is similar to the establishment of the EU or the North American Free Trade Agreement (NAFTA). In Asia, this came later. The first PTA in this region, signed in 1992, aimed to remove tariffs and non-tariff barriers among the six ASEAN countries. But now, all major countries in the wider Asia region have signed PTAs with the ASEAN countries and beyond, involving Japan, Korea, China, Australia, New Zealand and India. An even more ambitious proposal is under discussion to create a broad free trade zone in the Asia-Pacific region.

Trade under the Asian PTAs is characterized by a deepening production network that spreads across borders. One of the benefits generated by liberalization is the optimization of production and distribution systems on a regionwide scale. As different markets have become open to others, business strategies for production networks have changed. Concentration of production in one country has been replaced with more fragmented production that is spread across several different countries with more favourable conditions. The effect of such divisions of labour and horizontal production networks is observed most clearly in the case of the automotive industry.

With the introduction of the ASEAN Industrial Cooperation scheme of 1996, tariffs on some intraregional and intra-industry trade were reduced and eventually eliminated. Accordingly, automotive production blocks in Southeast

Asia came to differ from country to country. For example, the production of automobiles by Japanese automakers in Thailand grew rapidly in the late 1980s after the appreciation of the yen. It then accelerated in the early 1990s due to an unprecedented economic boom and the Thai government's liberalization policy. The Thailand–Australia FTA, which came into force in 2005, affected the pattern of automobile imports into Australia. Imports of cars from Thailand have been increasing steadily, while those from Japan have decreased markedly. This implies that Japanese auto manufacturers began to use Thailand as the centre of production not only for Thailand but for Australia as well, thus benefitting from the preferential tariff treatment under the Thailand–Australia FTA.

Analysis of the production of car engine parts points to increasingly clear-cut trends towards relocation to and centralization in certain countries. Indonesia, Singapore and Thailand have picked up the lion's share of production. By 2007, this industry had grown up to 38 times from 1990-levels in Thailand and 148 times in Indonesia. In contrast, Malaysia, which once had a relatively large share, has lost its position. Other types of components makers, such as those producing steering wheels and gearboxes, show trends different from the engine parts industry. The steering wheel industry has become concentrated in Thailand and Malaysia and the gearbox industry in Indonesia and the Philippines.

Conclusion: The Changing Pattern of Trade of Finished and Intermediate Products in Asia

In response to a variety of changes that have occurred over the last two decades, Japanese manufacturing companies have reorganized their value chains across the Asian region. Their key strategy is to keep the most value-adding part of the value chain at home and move the least profitable part to Asian countries. This has been most noticeable in the electronics sector. In electronics, Japanese companies lost much of the world market to Chinese, Korean and Taiwanese manufacturers, but companies that produce key components and materials still maintain dominant positions. China is now the largest importer of electronic parts and intermediate products, as well as the largest exporter of finished electronic products. This is discernible in the trade flow in Asia (Figure 10.8).

Japan still maintains a trade surplus, but today more than 90 per cent of its exports to Asia are in intermediates and high grade raw materials, not finished products. Contrary to the widespread perception that China commands complete control over the entire length of the value chain, the fact is that it controls only the assembly stage and imports most of the parts, components and raw materials from neighbouring Asian countries, including Japan. When it comes to finished products, China practically dominates the world production of personal computers, with its share now running at 96 per cent. It is by far the biggest exporter to the United

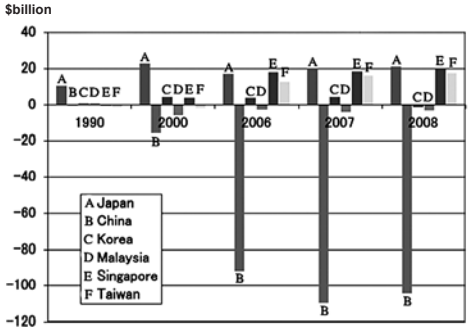

Figure 10.8a Trade of electronic parts in East Asia (net export)

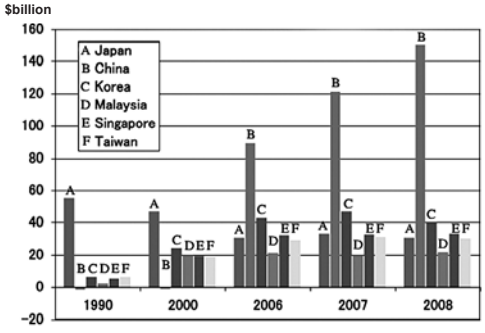

Figure 10.8b Trade of finished electronic products in East Asia (net export)

Source: Created by FRI from WTO data.

States and EU. However, much of such production and export is executed under the brand names of large multinational companies like HP, Dell and Acer.

In contrast with the electronics industry, the horizontal fragmentation in the automotive industry is less visible and slow moving. But as a result of the decision by Japanese companies to produce in the vicinity of the market, and also as a result of PTAs that eliminate or reduce barriers to the free movement of parts and finished products, the production of automobiles in Asia is booming. Some vehicles are shipped back to the Japanese market. Not only do they increase local production, but they are also accelerating the horizontal division of labour across borders. Local production of parts is also on the rise. Overall, the Japanese manufacturing industry will continue to adapt to the ever-changing structure of the global value chain.

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