2 Japan's Electronics Companies

In Search of Strategies for the 'New Economy' Era

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Introduction

The rise of the information and communications technology (ICT) revolution amidst sagging domestic demand in the 1990s has led Japanese electronics companies to relocate and reorganize their networks of production, distribution, and research & development. Increasing global competition, on the one hand, is placing pressures on Japanese companies to either abandon manufacturing low value-added products or move them to overseas production bases. Table 2.1 shows the combined overseas production ratios of the major Japanese electronics companies – Fujitsu, Hitachi, Matsushita, NEC and Toshiba – grew to over JPY 11 trillion by FY 2000, with a 28.8 per cent overseas production ratio. Although this is a decline from the previous year, it marks a significant increase over the previous decades when an export-oriented approach predominated. Matsushita's 35 per cent overseas production ratio is the highest among the major Japanese electronics companies and. Hitachi trails the pack with the lowest overseas production ratio. Nevertheless, on a value basis, it is the third largest overseas producer at JPY 2.35 trillion. In short, overseas production is becoming very much a part of the business strategies of Japanese electronics companies.

In East Asia, Japanese electronics companies initially relocated their overseas production bases in the Asian NIEs (newly developing economies) in the 1970s, and then in the 1980s to the ASEAN (Association of Southeast Asian Nations) countries (Fujita and Hisatake 1998; Borrus et al. 2000). While Japanese electronics companies assembled finished products for local markets, local companies have developed the capacity to produce these low-end products, gradually nudging Japanese electronic companies towards a production network strategy stretching across national borders (Tachiki 2004). Rather than targeting one country for direct investment, Japanese companies are segmenting their production process and manufacturing a product's core technology in Japan and manufacturing or procuring (e. g., electronic manufacturing services, international procurement offices) the mechanical (e. g., electric and electronic components) and

Table 2.1: **Overseas Production of Major Japanese Electronics Companies***

Companies	Fiscal years		
	FY '99	FY '00	FY '00 value
Electronics industry average**	22.7	–	–
Major five companies***	29.2	28.8	11.4
Fujitsu	32.5	29.7	1.9
Hitachi	21.2	23.4	2.4
Matsushita	35.1	35.1	3.4
NEC	26.6	24.1	1.5
Toshiba	31.4	31.2	2.4
Sony****	68.3	67.2	4.9

Notes: Figures for each fiscal year are in per cent of the total sales. The value figures for fiscal year 2000 is in trillions of yen. * The industry average for FY 1999 is an estimate. ** The figures are on a consolidated base, and include intra-firm transactions. *** The major five companies' figures are weighted average. **** Sony's geographical classification is customer-based, not production facility-based.

Source: Compiled by FRI based on annual reports (1999 and 2000) and METI (2001).

non-mechanical (e. g., metal and plastic parts) components in third countries and then assembling finished products for local and global markets in a host country. The 1997 Asian financial crisis negatively affected their overseas operations and production networks, but Japanese electronics companies are now using their hard lessons to take advantage of relocating production to China (Ernst 1997; Marukawa 2002; Yuan 2001).

The American-led IT revolution sweeping across the globe, on the other hand, has ignited domestic demand for IT-related goods and services. Japanese consumers are driving the rapid growth in the use of personal computers and mobile phones. In addition, the astonishing proliferation of Internet websites and the popularity of NTT DoCoMo's i-mode on-line services moved the Japanese government to implement a coherent policy strategies for promoting e-commerce throughout Japan (MPHPT 2001).

In response to buoyant demand for IT-related goods and services, Japanese electronics companies have been enjoying a relatively comfortable domestic business climate after the bursting of the bubble asset economy in 1990 compared with Japanese firms in other industries, such as the construction, retail, and banking sectors. In this connection, Table 2.2 shows the electronic components and devices makers have enlarged

their share of the industry output while the industrial and consumer electronic equipment makers' share of industry output has contracted. Kurihara and Tachiki (2004) found that over the past decade, the electronic components and devices sub-sector has been undergoing a gradual reorganization of its product lines from analog to digital products, contributing to a revival of the Japanese economy.

Table 2.2: **Export Structure of Japan's Electronics Industry**

Industry Sub-sectors	**'93**	**'94**	**'95**	**'96**	**'97**	**'98**	**'90**	**'00**
Consumer electronic equipment	16.3	13.9	11.3	10.7	10.2	11.6	11.4	10.7
Industrial electronic equipment	31.9	28.3	25.4	25.4	27.8	26.6	24.4	22.6
Electronic components & devices	51.8	57.8	63.3	63.9	62.0	61.9	64.2	66.7

Notes: Figures are in per cent.
Source: Compiled by FRI based on JEITA statistics (2001)

Limitations on the validity of government statistics sometimes confuse and mislead us, especially when we have no prior, detailed knowledge about multinational corporations (see MOF 2000 pp. 1–2; Belderbos 1997 pp. 117–119). The conventional wisdom based on these statistics is that the 1990s was the "lost decade" in Japan – that is, the Asian financial crisis discredited the "closed" production networks of Japanese companies and the IT revolution by-passed them. It is difficult to reconcile official statistics with the dynamic nature and complexity of the globalisation of Japanese companies, however. Even during the "lost decade", Japanese electronics companies have made strategic headway on both the overseas relocation and domestic reorganization fronts. Although the jury is still out whether this strategic course will revive the competitive positions of Japanese companies in the marketplace, at this juncture it is worthwhile to examine the business activities of Japanese companies at the firm-level to grasp the current situation of Japanese electronics companies at the beginning of the 21st century.

Relocation

Many studies conclude that the geographical choice of Japanese companies depends on the organization of either their horizontal inter-firm linkages or vertical inter-firm linkages (e. g., Head et al. 1995; Zhang and Markusen 1999). A careful examination of Fujitsu's geographical location of production in this regard reveals some interesting features representative of Japanese electronics companies.

Table 2.3 shows that Fujitsu's overseas sales figures stood at around 30 per cent in FY 2000. This figure lies between the average for Japanese manufacturing companies (34.9 per cent in FY 1999) and that of Japanese electronics companies (22.7 per cent in FY 1999). Japanese electronics goods are well known throughout the world, but the domestic market is still the larger contributor to overall sales. In addition, the geographical location of Fujitsu's overseas sales ratio reflects the company's orientation toward the developed countries, especially in the United States (10.8 per cent in FY 2000) and Europe (10.4 per cent). Despite a fall in the EUR, its share in the European region remained in double digit figure for FY 2000.

Table 2.3: **Fujitsu's Overseas Sales Ratios by Region**

	Fiscal Years		
Regions	**Industry average**	**FY '99**	**FY '00**
Total overseas production	20.8	32.5	29.7
North America	7.0	10.6	10.8
East Asia	8.5	8.8	8.6
Europe	4.6	13.1	10.4

Notes: Figures are for per cent of total sales. * The industry averages are for FY 1998. ** The figures are consolidated, including intra-firm transactions. *** Fujitsu's geographical segmentation is as follows: (1) The figures for North America are based on the figures for the USA and Canada in Fujitsu's annual reports. (2) The figures for Asia are based on the figures for China, Thailand, Vietnam, the Philippines, Singapore, Taiwan, and Australia. (3) The figures for Europe are based on the figures for the UK, France, Sweden, Germany, Finland, and the Netherlands.

Source: Compiled by FRI based on Fujitsu annual reports (1999 and 2000) and METI (2001).

The geographical concentration of Fujitsu's overseas sales in the developed countries can be understood when compared with those of other Japanese electronics companies in Table 2.4. Fujitsu's overseas sales are primarily in North America (10.8 per cent) and Europe (10.4 per cent). Although Matsushita and Toshiba have a higher percentage of sales in North America (12.4 per cent and 11.5 per cent respectively), they have even higher sales in East Asia (15.8 per cent and 12.4 per cent respectively) than Fujitsu (8.6 per cent). In Europe, unlike other Japanese electronics companies, Fujitsu has acquired a local company, ICL in the United Kingdom, rather than build a greenfield facility. Consequently, its overseas sales figure has remained in the double digits range over the past years, unsurpassed to date by any other Japanese electronics companies in overseas sales in Europe.

Table 2.4: **Regional Sales of Major Japanese Electronics Companies**

Regions	Fiscal Years					
	Ind. average	**Fujitsu**	**Hitachi**	**Matsushita**	**Toshiba**	**Sony**
All regions	20.8	29.7	23.4	35.1	31.2	67.2
North America	7.0	10.8	9.1	12.4	11.5	29.8
East Asia	8.5	8.6	6.6	15.8	12.4	17.2
Europe	4.6	10.4	4.2	6.9	6.6	20.1

Notes: Figures given as a per cent of total sales. * The industry averages are for FY 1998 and company figures are for FY2000. ** The figures are consolidated including intra-firm transactions. *** Geographical location of each firm does not necessarily exactly correspond to that of the other companies. **** Sony's geographical classification is customer-based, not production facility-based.

Source: Compiled by FRI based on 1998, 1999, 2000 annual reports and METI (2001).

Table 2.5 provides more detailed information on Fujitsu's overseas activities by business segment. It is clear that Fujitsu has implemented an overseas sales strategy for its high-end electronic devices with global demand – for example, personal computers, flash memories, logic integrated chips, compound semiconductors, liquid crystal displays, optical transmission systems (especially in the United States), and project finance initiative (PFI)-related services (especially in Europe). A second large business segment is low-end products with domestic demand – for example, small form factor hard disk drives (in East Asia).

At the same time, Fujitsu is boosting domestic production of its high-end products with global demand – for example, UNIX servers, network business services, especially outsourcing, compound semiconductors, plasma display panels, liquid crystal displays. Another important business segment is for high-end and exclusively competitive products and services. This category includes network business services, especially outsourcing for domestic institutions. As these business segments grow, Fujitsu is discontinuing its production of low-end products with global demand – for example., DRAM. These trends are reflected in Table 2.5 where Fujitsu has higher levels of overseas sales for its electronics devices (50.8 per cent in FY 2000) and telecommunications (46.3 per cent), but it has lower overseas sales ratios for domestic market oriented business segments in service and software (27.9 per cent) and information processing (32.3 per cent).

Fujitsu's product-by-product relocation strategies have affected its internal transactions. Table 6 shows the highest ratios of intra-firm trans-

Table 2.5: **Fujitsu's Overseas Production Ratios by Business Segment***

Business segments	Fiscal years	
	FY '99	FY '00
Total operations (excluding, intra-firm transactions)**	36.2	34.5
(1) Services & software	33.1	27.9
(2) Information processing	34.8	32.2
(3) Telecommunications	46.0	46.3
(4) Electronic devices	47.8	50.8
(c. f. total operations incl. intra-firm transactions)	32.5	29.7

Notes: Figures are in per cent of the sales figures. * Figures for each operational segment the numbers excluding intra-firm sales figures, unless otherwise specified. ** Major products and services of the operational segments are as follows: (1) Services & software: system integration services, system engineering support, consulting, network services, outsourcing, software, maintenance and system construction works. (2) Information processing: servers, personal computers, magnetic disk drives, optical magnetic disk drives, printers, automatic teller machines (ATM), POS systems. (3) Telecommunications: digital switching systems, optical transmission systems, optical undersea transmission systems, corporate information network systems, mobile telecommunication systems, cellular phones. (4) Electronic devices: system LSIs, flash memories, surface acoustic wave (SAW) devices, compound semiconductors, plasma display panels (PDP), liquid crystal displays (LCD).

Source: Compiled by FRI based on Fujitsu annual reports for 1998, 1999, and 2000

actions among its business segments is in electronic devices (26.3 per cent) and information processing (16.6 per cent). These are business segments most closely related to the IT boom in Japan. This accounts for the declining overseas intra-firm transaction ratio (44.3 per cent à 39.6 per cent) between 1997 and 2000 and its rise in Japan (13.3 per cent à 15.6 per cent).

Fujitsu's differentiated business segment strategies lead to different relocation strategies. In the developed countries, they established assembly factories for the production of colour TV sets, videocassette recorders, and semiconductors to defuse bilateral trade frictions with the United States and the European Union. In the developing countries, they relocated their domestic production facilities to either send their exports via a third-country route to the markets in the developed countries and lessen trade frictions, or seek production sites with lower labour and related costs during the rapid appreciation of the JPY following the 1985 Plaza

Table 2.6: **Fujitsu's Intra-firm Transaction Ratios**

Regions	Fiscal years			
	FY '97	FY '98	FY '99	FY '00
Fujitsu's intra-firm Transaction Ratio*	13.3	15.1	16.0	15.7
Japan	10.2	12.0	14.1	13.6
Overseas, all regions	44.3	45.6	40.6	39.6
Operational segments**				
Services & software	2.8	2.5	3.8	3.4
Information processing	12.0	12.7	14.8	16.5
Telecommunications	2.5	1.5	1.5	2.1
Electronic devices	24.5	17.6	20.7	26.3

Notes: Figures are in per cent of the total sales. * Figures for each operational segment exclude intra-firm sales figures. ** Major products and services in the operational segments are the same as in the previous table.
Source: Compiled by FRI based on Fujitsu annual reports for 1998, 1999, and 2000.

Accord, or penetrate domestic markets heavily protected by import constraints imposed by the developing countries governments. A broader examination of the forward and backward linkages of Japanese electronics companies in general provides further purchase on their relocation strategies.

Do Forward Linkages Matter?

Some scholars argue that Japanese companies have closer vertical and horizontal production linkages compared with their American and European counterparts (Head et al. 1995, Zhang and Markusen 1999). Table 2.7 shows that Japanese electronics companies sell 39.9 per cent of their products and services to their *keiretu*-related companies in the world. In the United States, for example, intra-firm sales of electronics products and services by Japanese electronics companies account for 42.1 per cent.

In East Asia, 61.7 per cent of locally produced goods in FY 1998 were intra-firm sales. In the ASEAN-4 countries – Malaysia, Thailand, Indonesia, and the Philippines – intra-firm sales account for a predominant 72.9 per cent. In the Asian NIEs-3 – Singapore, Taiwan and South Korea – Japanese electronics companies shipped 42.2 per cent within the same company group. Thus, the sales of Japanese electronics companies in East Asia are primarily in components and devices. This suggests the production networks of Japanese electronics companies do not extend directly to

Table 2.7: **Intra-Firm Sales of Japanese Electronics Companies**

Regions	Destination						
				Third Country			
	All Regions	Local	Japan		North America	East Asia	Europe
All regions	39.9	16.0	96.5	57.7	49.1	64.1	53.1
North America	13.5	10.0	99.0	22.9	24.9	21.5	17.8
United States	13.6	10.0	99.0	22.9	24.9	21.5	17.8
East Asia	61.7	20.5	96.3	64.0	55.3	66.4	66.1
China	65.6	23.9	95.2	84.2	47.3	88.5	74.5
Hong Kong	69.0	36.6	94.5	71.3	60.5	78.1	72.1
ASEAN-4	72.9	31.5	96.6	63.9	59.3	64.8	73.4
NIEs-3	42.2	12.4	96.7	46.1	50.2	41.7	61.2
Europe	42.1	28.5	96.9	59.8	71.3	34.3	60.5

Note: Figures are in per cent of their sales values in each region for fiscal year 1998. ASEAN-4: Malaysia, Thailand, Indonesia, and the Philippines; NIEs-3: Singapore, Taiwan, and South Korea.

Source: Japan's Ministry of Economy, Trade and Industry (Japan) 2001a and 2001b (March) pp. 211–217.

electronics markets but to the different production base in the region (Ng and Yeats 1999).

Despite a high level of forward linkage at 61.7 per cent in East Asia, they do not possess strong forward linkages within host countries in East Asia (20.5 per cent). Rather, they have stronger forward linkages within the East Asia region (Asia in the third regions: 64.0 per cent) – it could confirm that Japanese electronics companies have a complex arrangement of production networks within the region, as many analysts suggest (METI 2001b, pp. 11–8).

How About Backward Linkages?

Table 2.8 shows that the backward linkages of Japanese electronics companies are stronger than their forward linkages except in East Asia. While intra-firm transactions account for 59.4 per cent of procurement for all regions in FY 1998, intra-firm transactions account for 39.9 per cent of sales. By region, in FY 1998, the figures for intra-firm sales and intra-firm procurement are 13.5 per cent and 78.5 per cent in North America, 61.7 per cent and 49.5 per cent in East Asia, and 42.1 per cent and 50.5 per cent in Europe.

Table 2.8: **Intra-Firm Procurement of Japanese Electronics Companies**

Regions	Sources						
				Third Country			
	All Regions	Local	Japan		North America	East Asia	Europe
All regions	59.4	19.2	91.2	58.2	39.1	59.6	51.4
North America	78.5	40.9	99.1	65.9	32.1	68.5	92.6
United States	78.4	40.9	99.1	65.3	24.5	68.5	92.6
East Asia	49.5	8.6	80.8	57.9	32.8	58.8	10.8
China	52.9	13.5	79.2	84.2	29.0	85.6	11.6
Hong Kong	42.2	16.1	94.3	74.8	100.0	74.7	56.8
ASEAN-4	42.5	7.8	82.3	37.7	43.4	38.2	8.9
NIEs-3	56.7	3.8	80.0	73.4	24.8	74.4	25.6
Europe	50.5	14.1	93.8	51.2	74.1	46.5	52.4

Notes: Figures are in per cent of their procurement values in each region for fiscal year 1998. ASEAN-4: Malaysia, Thailand, Indonesia, and the Philippines; NIEs-3: Singapore, Taiwan, and South Korea.

Source: Ministry of Economy, Trade and Industry 2001a and 2001b (March) pp. 218–224.

Another characteristic of the backward linkages of Japanese electronics companies is their dominance in local area transactions. In FY 1998, the figures for sales and intra-firm procurement were 16.0 per cent and 19.2 per cent respectively. The comparable figures in North America were 10.0 per cent and 40.9 per cent. In short, Japanese electronics companies seem to sell their products and services to non-affiliated companies, but they are heavily dependent on their North America-based affiliates to procure components. In East Asia and Europe, however, the picture is the complete opposite. Japanese electronics companies sell a larger proportion of their products and services to affiliated companies (20.5 per cent in East Asia and 28.5 per cent in Europe), with less dependence on affiliates for their resources (8.6 per cent in Asia and 14.1 per cent in Europe). These contrasting outcomes suggest Japanese electronics companies in East Asia are not strictly concerned about *keiretsu*-type relations because they can purchase components from affiliates of either Fujitsu, Hitachi, NEC or Toshiba, which all belong to a 'Japanese procurement network.' In Europe, an arrangement of German-dominated indigenous procurement networks functionally replaces the 'Japanese procurement network.' Accordingly, they can safely produce their products or services in Europe without depending on backward linkages.

When we speak of Japanese production networks, then, the configurations are very different across business segments and regions of the world. In the developed countries, finished products and downstream sales linkages are important. In contrast, for East Asia, semi-finished products and upstream procurement linkages are important. Table 2.9 shows the productivity and efficiency statistics for Japanese electronics companies in three regions of the world for FY 1998. The table conveys two intriguing messages. First, overseas operations in developed countries, including the United Sates and Europe, show higher labour productivity (JPY 6.14 million in the United States, and JPY 5.76 million in Europe) and higher labour costs (7.4 per cent of sales in the United States, and 6.7 per cent in Europe). Overseas production in the developed countries, however, does not necessarily lead to higher profitability (-4.0 per cent of sales in the United States, and -1.3 per cent in Europe) or higher value-added ratios to sales (10.2 per cent in the United States, and 9.9 per cent in Europe).

Table 2.9: **Overseas Performance of Japanese Electronics Companies**

Regions	Economic Performance Indicators							
	Labour Productivity JPY mil.	Profits %	Value added %	Pay %	Advertising %	Information %	Logistics %	Rental %
All regions	2.15	-0.8	11.6	6.0	1.0	0.3	1.0	0.5
North America	6.13	-4.0	10.2	7.4	1.6	0.6	1.1	0.6
United States	6.14	-4.0	10.2	7.4	1.5	0.6	1.1	1.0
East Asia	1.40	2.5	13.3	4.9	0.4	0.2	1.3	0.4
China	0.77	1.5	7.8	3.7	0.6	0.2	1.1	0.6
Hong Kong	1.37	2.8	7.0	3.1	–	0.2	1.2	0.6
ASEAN-4*	1.29	2.7	17.7	4.2	0.2	0.2	1.2	0.3
NIEs-3**	3.68	3.0	12.5	6.8	0.3	0.2	0.7	0.4
Europe	5.76	-1.3	9.9	6.7	1.3	0.3	0.8	0.6

Notes: Figures are in per cent of the sales figures, unless otherwise specified, for fiscal 1998. * ASEAN-4: Malaysia, Thailand, Indonesia, and the Philippines. ** NIEs-3: Singapore, Taiwan, and South Korea.

Source: Japan's Ministry of Economy, Trade and Industry 2001a and 200b (March) pp. 350–366.

Second, in sharp contrast to Japanese companies in the developed countries, overseas operations in the East Asia region shows lower labour productivity (JPY 1.4 million). Despite the lower productivity, overseas production in East Asia is attractive for its lower labour costs (4.9 per

cent), higher profitability (2.5 per cent of sales), and higher value-added ratios to sales (13.3 per cent). These two messages suggest that Japanese electronics companies operate their businesses in the developed countries with a view to marketing finished products with higher cost to sales ratios (1.5 per cent of sales in the United States, and 1.3 per cent in Europe), while they consider their operations in East Asia as manufacturing bases to ship their components and devices to Japan or other markets, which would lead to lower sales costs like advertising (0.4 per cent)

Reorganization

The relocation of Japanese electronic companies business operations and the rise of production networks is only one half of the story. The other half of the story relates to the reorganization of the organizational structure and business segments in Japan.

Structural Reorganization Strategies

With the advent of the Internet, the world economy has undergone a sea change, with various types of industries – traditionally segregated or, partially related, if at all – combined into a huge ‚networked' or ‚wired' industry. Now, Japanese electronics companies have started reorganizing their business segments – each specializing in home appliances, communications, broadcasting, financial services, electronic devices, to name but a few – into suitable organizational structures for surviving global competition in the 'New Economy' era. Table 2.10 shows the various reorganization strategies according to the economic motives of Japanese electronics companies.

Table 2.10: **Japanese Electronic Companies' Strategic Business Segments**

Firms	**Sales***	**Business Segments**
Large Electronics Companies		
Hitachi Ltd.	8 417	1. Information systems & electronics 2. Power & industrial systems 3. Consumer products 4. Materials 5. Services & other
Matsushita Electric Industrial Co. Ltd.**	7 682	1. AVC networks 2. Industrial equipment 3. Home appliances 4. Components and devices

Firms	Sales*	Business Segments
Sony Corporation	7 315	1. Electronics – audio 2. Electronics – video 3. Electronics – televisions 4. Electronics – information and communications 5. Electronics – electronic components and other 6. Games 7. Music 8. Pictures 9. Insurance 10. Other
Toshiba Corporation	5 951	1. Information & communications and industrial systems 2. Digital media 3. Power systems 4. Electronic devices & components 5. Home appliances 6. Others
Fujitsu Ltd.	5 484	1. Service and software 2. Information processing 3. Telecommunications 4. Electronic devices
NEC Corporation	5 410	1. Solutions 2. Networks 3. Electron devices 4. Others
Mitsubishi Electric Corporation	4 129	1. Energy and electric systems 2. Industrial automation systems 3. Information and communications 4. Electronic devices 5. Home appliances 6. Others
Canon Inc.	2 781	1. Business machines – copying machines 2. Business machines – computer peripherals 3. Business machines – business systems 4. Cameras 5. Optical products 6. Other products
Sharp Corporation	2 013	1. Audio-visual equipment 2. Home appliances 3. Communication and information equipment 4. Consumer/information products 5. Electronic components

Firms	Sales*	Business Segments
Sanyo Electric Co. Ltd.	1 940	1. AV information and communications equipment 2. Home appliances 3. Industrial and commercial equipment 4. Electronic devices 5. Batteries 6. Others
Ricoh Company Ltd.	1 538	1. Office equipment – imaging solutions 2. Office equipment – network input/output systems 3. Office equipment – network system solutions 4. Other businesses
Major Electronic Components Companies		
Kyocera Corporation	1 285	Equipment; electronic device; fine ceramics; other
Seiko Epson Corporation	1 050	Information equipment; electronic devices; precision products; other
TDK Corporation	690	Electronic components; data storage components; recording media & systems; semiconductors; other
Alps Electric Co. Ltd.	547	Computer peripherals; wireless communications; digital broadcasting; car electronics; components
Hitachi Metals Ltd.	463	
Murata Manufacturing Co. Ltd.	459	Capacitors; piezoelectric components; microwave devices; module products; resistors; other
Rohm Co. Ltd.	360	Integrated Circuits; discrete semiconductor devices; passive components; displays
Mitsumi Electric Co. Ltd.	247	

Notes: Sales in JPY billions. * The sales figures are the latest figure for each company, usually for FY 2000, ending in March 2001. ** Matsushita Electric Industrial's business segments until March 2001 were 1. Consumer products – video and audio equipment, 2. Consumer products – home appliances and household equipment, 3. Industrial products – information and communications equipment, 4. Industrial products – industrial equipment, 5. Components

Sources: Annual reports and websites of individual firms.

Based on the business segments each of the major Japanese electronics companies pursues, three basic reorganization strategies are evident: (1) reorganization strategy to enhance efficiency and concentrate resources on strategic business segments by combining closely related business segments within a company or a corporate group, (2) reorganization

strategy to reduce business risks and uncertainties in emerging business segments by combining closely related segments with other companies, and (3) reorganization strategy to enhance efficiency and concentrate resources on strategic business segments by pruning underperforming business segments.

The rapid advance of ICT has forced Japanese electronics companies to enhance their efficiency and therefore to concentrate their financial, human, and technological resources on closely related business segments. In January 2001, for example, Matsushita Electric Industrial Co. Ltd. announced that it would absorb Matsushita Electronics Corporation, with a view to enhancing the efficiency and competitiveness of their semiconductor products. In addition, Matsushita Electric Industrial Co. Ltd., in April 2001, combined its two consumer products segments forming a single business segment – (a) Consumer Products – video and audio equipment, and (b) Consumer Products. Under consumer products, it merged its video and audio equipment business segments, and under the consumer products, its home appliances and AVC networks. This latter merger was not only to improve operating efficiency, but also to take advantage of technological advance where every home appliance might be transformed to a ‚digitized or digital home appliance. A similar story can be found among all of the major electronics companies. Consequently, one reorganization strategy is to combine closely related business segments within a company or a corporate group to enhance efficiency and concentrate resources on strategic business segments.

A related reorganization strategy embraced by Japanese electronics companies is to either exit or consolidate a business segment. In October 2000, for example, Toshiba purchased the wireless transmission business segment of Oki Electronic Industry, Co. Ltd. Toshiba and Oki Electronic were seeking mutual benefits: Toshiba wanted scale of economy by bolstering this business segment, while competitor Oki Electric wanted to exit this unprofitable business segment in order to re-direct organizational resources toward the remaining profitable segments. Consequently, we are witnessing a period where Japanese electronics companies are pruning under-performing business segments to enhance efficiency and concentrate resources on strategic business segment*s*.

Another reorganization strategy is linked to the need for reducing business risks and uncertainties associated with emerging business segments. The idea of electronics manufacturing service (EMS) is gaining acceptance among Japanese electronics companies (METI 2001b, p. 8), but to keep apace of emerging technologies, they must be able to reduce the time required to develop new products and services. In this connection, strategic technological alliances (STA) are opening up the close inter-firm,

intra-group *keiretsu* business relationships. For example, in November 2000, twelve electronics companies, including Hitachi Ltd, Matsushita Electronic Industrial Co. Ltd and Toshiba, established the ePF Network Corporation to standardize an 'e-Platform' for interactive broadcasting and storage data-casting services for Japan's digital TV broadcasts. A STA does not take into account traditional business linkages, such as nationality and *keiretsu* relationships. In some areas, Japanese electronics companies are deepening their STAs. The American Boeing Company and Mitsubishi Electric Corporation, for example, announced in June 2001 that they would forge an alliance in the emerging space-based communications and other related fields requiring a high expenditure on R&D. In the same month they signed another agreement to broaden their co-operation further to include space-based communications, air traffic management, multimedia, navigation, space and communications services, launch services, and space infrastructure markets. Consequently, we find Japanese electronics companies combining closely related business segments with third party companies, regardless of previous business ties and nationality of partners, to reduce business risks and uncertainties in emerging business segments.

The abovementioned consolidation, merger and acquisition, and strategic alliances are the three major trends leading to a reorganization of not only the Japanese electronic companies, but also the structure of the industry.

Product-by-Product Reorganization Strategies

As part of the structural reorganization of business segments, Japanese electronics companies are also re-examining their global networks product by product. Table 2.11 summarizes interviews with corporate strategic planners on their competitiveness, profitability, and global acceptance of their products and services yielding a general classification of products by whether they are (1) high-end and global demand, (2) high-end global demand with Japanese electronics companies' exclusive competitive edge over their foreign competitors, (3) high-end, global demand with foreign electronics Companies' exclusive competitive edge over their Japanese counterparts, (4) high-end and local demand, (5) low-end local demand, and (6) low-end and global demand. The seventh product category is "low-end and retreating from global markets", is not discussed here, but represents the end of the product life cycle.

In the first product category, high-end products and services with global demand, Japanese electronics companies are forced to locate production facilities across the globe to meet the burgeoning local market

Table 2.11: **Products and Services Under Considerations for Overseas Production**

Classification of products & services	Supply-side changes			
	Relocation Strategies of Companies	Change in Domestic Production	Change in Exports	Change in Imports
(1) High-end and global demand (e. g. digital signal processor (DSP), light emitting diode (LED) for display)	Global	Growing with high volume	Growing	Growing
(2) High-end and exclusively competitive (for example, CCD area image sensor, colour-PDP (plasma display panel), WDM-related optical fibre)	Domestic	Growing with high volume	Growing	–
(3) High-end and exclusively uncompetitive (e. g., field programmable gate array (FPGA), wavelength division multiplexing (WDM) systems, package-software)	(purchase through OEM, etc.)	Very limited, or growing in foreign Companies	–	Growing
(4) High-end and domestic demand (e. g., car navigation systems)	Domestic	Growing	–	–
(5) Low-end and domestic demand (e. g., mini disk (MD), magneto-optical disk (MO))	Located overseas	Growing	–	Growing
(6) Low-end and global demand (e. g., low-priced video cassette recorders (VCR), erasable programmable ROM (EPROM))	Located overseas/ Discontinuing	Declining/ Discontinuing	Declining	Growing
(7) Low-end and disappearing globally (e. g. low-priced colour television sets, magnetic tapes)	Discontinuing	Declining/ Discontinuing	Declining	Declining

Notes: Figures are in per cent of their procurement values in each region.
Source: Compiled by FRI based on company interviews.

demand but they do not have a clear competitive edge. Some examples of the high-tech electronic components falling into this category include the digital signal processor (DSP) and light emitting diode (LED). The DSP is one of key devices for electronic products including the growing markets for mobile phones and digital home appliances. American electronics companies have a dominant share, spearheaded by Motorola (for the use of cellular phone production, over 40 per cent of market share). Lucent Technologies, Analog Devices, Inc. Nokia and Ericsson are taking the lead in DSP for use in 3G mobile phones. Japanese electronics companies including NEC, Fujitsu, Sony, Sanyo, and Hitachi produce DSP but they are not dominant players. The LED for display is also expected to grow despite gloomy prospects surrounding the other types of LED. Around ten years ago, Japanese electronics companies had an invincible advan-

tage over their global competitors. Throughout the 1990s, however, Taiwanese firms such as Liteon, Universe Electron Company, PotoTech and Tyntec have managed to capture market share by offering low cost attractive products.

In the second product category, Japanese companies have a competitive edge in high-end and exclusively competitive domestic products and services. For example, Sony, Matsushita, and Sharp have the dominant global market share in charge-coupled device (CCD) area image sensors. In particular Sony's share exceeded 50 per cent in FY 2000, followed by Matsushita's (around 20 per cent), then by Sharp's (around 16 per cent). CCD linear image sensors are also one of the high-end and exclusively competitive products supplied by Japanese electronics companies. In this case, Toshiba has the lion's share (around 55 per cent), followed by NECs' (33 per cent), then by Sony's (11 per cent) for 2000. Consequently, Japanese electronics companies have little motivation to relocate their production facilities overseas.

In the high-end and exclusively uncompetitive products and services category, none of the Japanese electronics companies have an edge over their foreign competitors. The flexible programmable gate array (FPGA), for example, has great growth potential. Currently, American Companies – Xilinx and Altera – occupy over 80 per cent of the global market, while other foreign companies, including Lucent Technologies and Lattice, are entering this lucrative market (Chunichi-sha 2001, pp. 693–694). The supply of the optical fibre amplifier and related wavelength division multiplexing (WDM) systems are virtually dominated by the major American Companies – Nortel Networks (its market share for the first half of 2000: 54 per cent), Lucent Technologies (17 per cent), CIENA Corporation (12 per cent) and European Alcatel (9 per cent). Japanese electronics companies, such as NEC, Fujitsu, Sumitomo Electric, Furukawa, Fujikura, and Hitachi, are adopting small-volume production in order to have a foothold in this growth market (Chunichi-sha 2001, pp. 693–694).

A key commonality among these products is that there are high risks and uncertainties. Consequently, few Japanese electronics companies are aggressively expanding their production facilities, neither in Japan nor abroad. Instead, foreign companies have a huge window of opportunity to produce this type of product and service in Japan. One of the most representative products and services in this genre is package software. Throughout the world Microsoft has an unparalleled position in this field. Despite its excellent Japanese-language word-processing software, JustSystem Corporation could not stave off Microsoft's incursion into the Japanese market. Moreover, other American software companies have

localized their package software, ranging from utility and security software to database software, and have established a strangle hold on the Japanese market. Japanese software products have been pushed into narrow market segments in such areas as embedded software, customized software, and animation-related software.

In the high-end products and services with domestic demand category, digital map used in car navigation systems in Japan is a good example. This product is for exclusive use in Japan and cannot be sold in overseas markets. Thus few foreign companies express an interest to supplying this type of product and service to Japanese consumers. Therefore, the development and production of this type is located with high probability in Japan.

For the "low-end and indigenously demanded products and services with domestic demand" category, the 3.5 inch magneto-optical disk is a good example. Over 80 per cent of global market demand for this product resides in Japan. Moreover, usually this type of product or service is low-end and yields a nominal profit margin. Another good example is mini disks. Japan accounts for over 70 per cent of global market demand for this product, with the European market accounting another 20 per cent. Consequently few Japanese companies and even fewer European companies are interested in producing this type of product. Thus Japanese electronics companies will produce these products abroad or ask a company in a low cost production base to export them to Japan.

In the last product category, Japanese electronics companies try to exit "low-end products and services with global demand" because of the fierce competition and its low profit margins. Take the case of erasable programmable ROM (EPROM). Since the mid-1990s, American, European have entered the EPROM market. Now South Korean and Taiwanese firms, including STMicroelectronics and Atmel, are producing EPROMs, leading to a price war and declining profit margins. Japanese electronics companies have therefore almost discontinued their production of EPROM, shifting their focus instead to flash memories.

FUTURE CHALLENGES IN A NEW ECONOMY ERA

The paper started with the idea that the Southeast Asia is no longer the 'backyard' of the Japanese economy. During the 1980s, Japan's foreign direct investments (FDI) in the region was undeniably predominant, leaving hardly any room for other countries to match its economic su-

premacy across the region. East Asia is no longer unique, leading a movement toward the reorganization and relocation of firm-specific assets based on global linkages and not on Japanese organizational linkages. Japan's leading position in East Asia, however, is now under re-evaluation in the ‚New Economy' era. An East Asia equipped with ICT is now strengthening its ties with the United States. This initiative is spearheaded by start-up companies emerging from Silicon Valley and the I-128 area and centres on ICT industries emerging at an astonishing pace. Thus, the 1990s and the turn of the 21st century have witnessed drastic transformation in the region, from an economically Japan-centred East Asia to an East Asia with more competitive markets. In short, East Asia is no longer uniquely Japanese-dominated in economic terms nor in security and societal/cultural terms.

Table 2.12 shows inward foreign direct investments (FDI) in East Asia, comparing multinational corporations whose home country is either Japan, the United States, or Europe. In the early 1990s, inward FDI of Japanese companies was higher in value terms than that of their American and European counterparts. In the late 1990s, however, the presence of American, European, and ethic Chinese companies has been growing. Especially in continental China, which is now the largest destination for FDI in the world. American and European as well as ethnic Chinese FDI to China overshadowed that of Japanese FDI in the late 1990s. Moreover, after the Asian financial crisis South Korea is now reluctantly accepting American and European companies. European companies have not shown any sign of losing interest in East Asia. Even the 1997 Asian financial crisis did not curb their appetite for an economic slice of the region (EU-Japan Centre for Industrial Co-operation 2001). The rise of Western and ethnic Chinese companies in the region has left Japan's fading dominance confined to the member countries of ASEAN.

As the production networks of European companies, as well as those of American and ethnic Chinese companies, take shape in East Asia, Japanese companies must accept the harsh reality that their dominance of production networks in the region is gradually unravelling. In the same way Japanese electronics companies came to be less dependent on their backward linkages in Europe, they should reorganize their backward linkages irrespective of the nationality of a company by re examining and re evaluating them to form Japanese-centred linkages. In this sense, Japanese companies should develop their novel strategies for survival of the fittest in the more competitive ‚New Economy' era by re-examining and streamlining their business segments.

Table 2.12: **Inward FDI in Asia: Japanese, American, and European Companies**

Host countries	Home country	1990–92 Relative to Japan		1993–95 Relative to Japan		1996–98 Relative to Japan	
		USD bill.	JPY =1.00	USD. bill.	JPY =1.00	USD bill.	JPY =1.00
East Asia Region, Total	Japan	22.9	1.00	40.5	1.00	47.5	1.00
	USA	16.7	0.73	42.0	1.04	39.9	0.84
	EU4*	17.0	0.75	42.6	1.05	51.8	1.09
China	Japan	3.4	1.00	15.0	1.00	11.3	1.00
	USA	4.0	1.17	20.3	1.35	18.3	1.63
	EU4	1.7	0.48	13.7	0.91	14.5	1.28
Taiwan	Japan	1.8	1.00	1.2	1.00	1.9	1.00
	USA	1.4	0.79	1.9	1.50	1.9	1.00
	EU4	0.4	0.25	0.7	0.57	0.7	0.35
South Korea	Japan	0.6	1.00	1.1	1.00	1.0	1.00
	USA	1.0	1.61	1.3	1.14	7.0	6.87
	EU4	1.1	1.78	0.8	0.7	4.9	4.79
ASEAN5**	Japan	17.0	1.00	23.1	1.00	33.3	1.00
	USA	10.2	0.60	18.5	0.80	12.6	0.38
	EU4	13.9	0.82	27.4	1.18	31.7	0.95

Notes: Figures are in billions of U.S. dollars. * EU4 designates Germany, France, United Kingdom, and the Netherlands. ** ASEAN5 designates Thailand, Indonesia, Singapore, Malaysia, and the Philippines.

Source: Compiled by FRI based on statistics prepared by Institute of International Trade and Investment. Original source: Hanson 2001. See also Masuyama et al. 2001, p. 25.

PROBLEMS ON THE HORIZON – STRATEGIES FOR COMPANY-WIDE REORGANIZATION AND RELOCATION

In order to meet the challenges of the ‚New Economy', Japanese electronics companies must make changes in the following areas: (a) procurement and financial settlement (for example the Internet-using open communications, or closed-style electronic data interchange systems), (b) logistics (for example, supply chain management), (c) marketing (for example, B2C/B2B e-Commerce), (d) financing (for example, cross-border merger-and-acquisitions), (e) R&D and technology, and (f) human resources. These are the new problems on the horizon Japanese companies are just beginning to address (Kato 1997).

As for procurement and logistics in the domestic area, Matsushita Electric Industrial, for example, has implemented a wholesale revamp of its domestic distribution, marketing, and financing networks. Matsushita announced in March 2001 that it would restructure its consumer sales networks. Before the announcement, Matsushita had 28 regional distribution-related subsidiaries within Japan but has now reduced them to seven by consolidating 22 affiliates into a single company. These moves are conducted along with others in other business segments including the financial business functions. In particular, cross-border M&A, which was once thought to be a phenomenon entirely unknown to Japanese electronics companies, is now regarded as a promising efficiency-enhancing option.

Furthermore, R&D strategies are now considered one of the predominantly key factors determining the destiny of Japanese electronics companies in the early 21st century. In the 'New Economy' era, the key determinants for economic success are (a) how swiftly companies can meet surging demand world-wide from their customers – in other words, what types of organization and location companies can have, and (b) how swiftly companies can sniff out and locate potential demand world-wide – in short, what types of product and service or production process can companies develop. In this sense, global R&D strategies for companies are extraordinarily important in developing their own products and services that are high-end/lucrative in demand, and exclusively competitive for them. Thus, the result of their global R&D strategies affects their reorganization and relocation strategies. In the past, it has been said that Japanese companies are generally more concerned with their globalization activity, focussing solely on their production or distribution networks, without taking into account global R&D activity. This issue is very important, and therefore it must be explored further (e. g., see Kumar 2001; Pearce 1999).

Finally, as Japanese electronics companies have expanded their overseas production facilities, they have increased their overseas labour force substantially (Denpa Shimbunsha 2001, p. 76.). Accordingly, better management strategies for global human resources development should be explored elsewhere. Advancement of globalization with the help of the spread of the IT revolution requires Japanese electronics companies to examine perpetually every facet of their activity both at home and abroad, and reorganize and relocate them continuously in the 'New Economy' era.

REFERENCES

Belderbos, R. (1997) *Japanese Electronics Multinationals and Strategic Trade Policies*, Oxford: Oxford University Press.

Belderbos, R., G. Capannelli and K. Fukao (2001) 'Backward Vertical Linkages of Foreign Manufacturing Affiliates: Evidence from Japanese Multinationals', *World Development*, 29 (1), pp. 189–208.

Borrus, M., D. Ernst and S. Haggard (eds) (2000) *International Production Networks in Asia*, London: Routledge.

Chunichi-sha (2001) *Denshi-buhin Nenkan* [Annual of Electronic Devices and Components], Tokyo: Chunichi-sha.

Denpa-Shimbun-sha (2001) *Denshi-kogyo Nenkan* [Electronics Industry Almanac], Tokyo: Dempa Publications.

Ernst, D. (1997) 'Partners for the China Circle? The East Asian Production Networks of Japanese Electronics Firms', in Naughton, B. (ed.) *The China Circle: Economics and Electronics in the PRC, Taiwan, and Hong Kong*, Washington, D. C.: Brookings Institution.

EU-Japan Centre for Industrial Co-operation (2001) 'Meet Asia in Japan 2001: Strategies for Globalization and Competitiveness in Asia', Mission Report, (March).

Fujita, M. and M. Hisatake (1998) '*Nippon to Higashi Ajia ni okeru Chiiki-Keizai Shisutem no Henyou* [A Transformation of the Regional Economic System in Japan and East Asia]', CCES Discussion Paper, Institute of Economic Research, Kyoto: Kyoto University.

Fujitsu (1998, 1999, 2000) *Annual Corporate Report*, Tokyo: Fujitsu Corporation.

Fukao, K. et al. (2000) 'Upgrading of Industrial Structure, Foreign Direct Investment and Economic Growth', *The Keizai-Bunseki* [*The Economic Analysis*], No. 160. (East Asian Economic Growth and Its Structural Change), Economic Research Institute, Japan's Economic Planning Agency, (December).

Hanson, G. H. (2001) 'Should Countries Promote Foreign Direct Investment?' United Nations Conference on Trade and Development (UNCTAD)/Center for International Development, Harvard University, *G-24 Discussion Paper Series,* No. 9, (February).

Head, K., J. Ries and D. Swenson. (1995) 'Agglomeration Benefits and Location Choice: Evidence from Japanese Manufacturing Investments in the United States', *Journal of International Economics*, 38, pp. 223–47.

Japan Electronics Industry Trade Association (JEITA) (2001) "Exports of Electronics from Japan and Imports of Electronics into Japan", Tokyo: JEITA.

Kato, T. et al. (1997) *Ajia-Nettowaku – Joho-shakai ni okeru Nihon no Senryaku* [Asian Network: Japan's Grand Strategy in the Age of Information Society], Tokyo: Nihon Keizai Shimposha.

Kumar, N. (2001) ‚Determinants of Location of Overseas R&D Activity of Multinational Enterprises: the Case of US and Japanese Corporations', *Research Policy*, 30 (1), pp. 159–74.

Kurihara, J. and D. S. Tachiki (2004) 'Industrial Competitiveness in East Asia: The Case of Japanese Electronics Components Industry', paper prepared for the World Bank project on the "comparative Study of Industrial Competitivness in East Asia, mimeograph.

Marukawa, T. (2002) ‚Japanese Foreign Direct Investment and China's Industrial Development in the Automobile, Electronics, and Textile Industries', in H. G. Hilpert and R. Haak (eds) *Japan and China: Cooperation, Competition, and Conflict*. New York: Palgrave, pp. 174–93.

Masuyama, S., D. Vandenbrink and S. Y. Chia (eds) (2001) *Industrial Restructuring in East Asia: Towards the 21st Century*, Tokyo: Nomura Research Institute (NRI)/Singapore: Institute of Southeast Asian Studies (ISEAS).

Ministry of Economy, Trade and Industry (METI) (2001a) *Dai-29-kai Wagakuni Kigyou no Kaigai-jigyou Katsudo/Dai-7-kai Kaigai-jigyou Katsudo Kihon Chosa* [The 29th Report on the Foreign Activities of Japanese Firms/The 7th Benchmark Survey of Foreign Direct Investment], (March).

Ministry of Economy, Trade and Industry (METI) (2001b) *Tsusho Hakusho* [White Paper on International Trade]), Tokyo: METI.

Ministry of Finance (MOF) (2000) *Zaisei Kinyu Toukei Geppo* [Ministry of Finance Statistics Monthly]), No. 581 (December).

Ministry of Public Management, Home Affairs, Post and Telecommunications (MPHPT) (2001) "e-Japan Priority Policy Program", http://www.kantei.go.jp/foreign/it_e.html

Ng, F. and A. Yeats (1999) 'Production Sharing in East Asia: Who Does What for Whom and Why?' World Bank Research Working Paper 2197, Washington, DC: World Bank.

Pearce, R. D. (1999) 'Decentralised R&D and Strategic Competitiveness: Globalised Approaches to Generation and Use of Technology in Multinational enterprises (MNEs)', *Research Policy*, 28 (2/3), pp. 157–78

Tachiki, D. S. (2004) "Between FDI and Regionalism: The Role of Japanese Production Networks", in T. J. Pempel (ed.) *Re-Mapping East Asia: The Construction of a Region*, Ithaca: Cornell University Press.

Yuan, Z. (2001) *Chugoku ni Ikiru Nichi-bei Seisan-shisutemu: Handotai-seisan-shisutemu no Kokusai-iten no Hikaku-bunseki* [Japanese and U.S. Production Systems Flourishing in China: A Comparative Study on

Technology Transfer of Semiconductor Manufacturing Systems], Tokyo: University of Tokyo Press.

Zhang, K. H. and J. R. Markusen (1999) 'Vertical Multinationals and Host-country Characteristics', *Journal of Development Economics*, 59 (2), pp. 233–52.