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THE NEW INTERNATIONAL DIVISION OF LABOUR IN ASIAN ELECTRONICS: WORK ORGANIZATION AND HUMAN RESOURCES IN JAPAN AND MALAYSIA*

Barry Wilkinson

University of Bath

Jos Gamble

Royal Holloway, University of London

John Humphrey

University of Sussex

Jonathan Morris

Doug Anthony

University of Wales, Cardiff

ABSTRACT

This article documents and analyses the organization of work and human resources management in ten manufacturing plants in Malaysia and three plants in Japan. Each of the plants carries out specific tasks within an emergent international division of labour surrounding two Japanese multinational producers of consumer electronics goods. Plant roles reflect their positions in commodity chains driven by the multinationals, varying in relation to product-to-product and component-to-component divisions of labour, and in relation to the location of product and process innovations. How work is organized and how workers are managed are explained by the location of each plant within this division of labour, and by the characteristics and situation of labour, the one commodity which talks back, within the local environment.

INTRODUCTION

There is an established and extensive literature on work organization and human resources management in Japanese manufacturing companies established in Japan and abroad. This has tended to focus on the 'transferability' of a 'Japanese system'

Address for reprints: Barry Wilkinson, School of Management, University of Bath, Bath BA2 7AY, UK.

of production and work organization to 'alien environments' and/or on the comparison of human resource strategies and practices in Japan and in Japanese companies in other countries (Abo, 1994; Cole, 1973; Lincoln and Kalleberg, 1990; Milkman, 1991; Morris and Wilkinson, 1995; Oliver and Wilkinson, 1992). The main rationales for these studies have been: (1) to understand whether Japanese multinationals can re-create their ('superior') production and organizing methods outside of Japan; and (2) whether they have to adapt their characteristic forms of management and organization to different social and economic circumstances. This literature has undoubtedly been useful, but a key problem which has occasionally been pointed up has been the difficulty of finding 'like-for-like' manufacturing plants (in terms of products, markets, size, etc.) for systematic comparison. While highlighting this problem, Dedoussis (1995) went further to argue that the human resource strategies of foreign (Australian) subsidiaries of Japanese multinational companies (MNCs) could not sensibly be compared with those found in Japanese parent companies because of the 'peripheral' status of the Australian plants. The Australian workforce was treated much the same as peripheral workers in Japan – hence for instance life time employment and seniority systems were not introduced, and there was little by way of human resources development.

This article attempts to take the analysis of the work organization and human resource implications of the international division of labour further through case studies undertaken in Japan and Malaysia. It reports on some of the findings of a major study of the electronics and clothing industries in Pacific Asia which documented an evolving intra-regional division of manufacturing operations and its implications for work organization and human resources management and development. A total of 70 case studies in seven Pacific Asian countries were generated between 1996 and 1998. Here we report on 13 consumer electronics plant case studies – three from Japan and ten from Malaysia – which were inter-linked through commodity chain relationships, and sometimes through ownership too. While the findings do suggest attempts to transfer some aspects of Japanese parent company practices to Malaysia, and conversely some adaptation to the Malaysian social and economic environment, they demonstrate the central importance of locating work organization and human resource practices in the context of the international division of labour.

Following an explanation of the research design we present an overview of the status and characteristics of the electronics industry in Malaysia, focusing on the role and activities of Japanese companies. This allows us to place our sample companies in context. We then provide a description of plant level activities and the way work is organized to fulfil plant objectives, with particular focus on comparisons between plants at different points in the commodity chain. In turn this leads into a related discussion of human resource practices. Our conclusions emphasize the importance of divisions of labour in the understanding of work organization and human resources management, and comment on the obstacles to, and potential for, further human resources development in the Malaysian electronics industry.

RESEARCH DESIGN

Our central hypothesis was that the nature of work organization and human resources development characterizing plants in different countries would depend

essentially on the position of each production unit in cross-national commodity chains. The products being made, the markets being served, and the activities undertaken at the plant would more heavily influence production and work organization and associated human resources management and development practices than an 'ownership logic' or host country cultures. Local political and labour market characteristics, however, might have a moderating influence. This hypothesis was developed in part from Gereffi's (1996a, 1996b) work on commodity chains, and the analysis was influenced by recent research on Japanese transplants in Mexico by Kenney and Florida (1994), in the UK by Elger and Smith (1998), and by Guyton (1995) in Malaysia. It was also influenced by the researchers' own previous work on Japanese manufacturing companies in the UK, Japan and North America.

Being centred on the management and human resource implications of an emergent Pacific Asian division of labour, the research was dependent on the generation of plant level case studies in different locations undertaking different, but related, activities. Three of the 13 case study plants analysed in this article are located in Japan, each of them assembling televisions. Two are owned by one Japanese company, one by another (competitor) Japanese company. Both are household names, and they 'drive' the commodity chains under study. The other ten are located in Malaysia, and of these, two are television assemblers owned by the two companies studied in Japan. Another three – components plants which supply into the assemblers studied – are linked through ownership to the two Japanese companies. The remaining five plants located in Malaysia, which supply components and packaging into the assemblers, have no ownership links to any of the other plants, but supply into the assemblers. Two of these are Japanese, one Taiwanese, and two Malaysian. Table I summarizes the ownership and supply chain links between the plants in the sample, together with information on products. (Further important information on plant links is reported later in the text.)

The case studies were generated by use of lengthy semi-structured questionnaires addressed to different managers within each plant and covering global positioning, products, markets, competitors, forwards and backwards linkages, production systems, work organization, and human resources management and development. The global strategies of the two Japanese companies at the centre of the production networks were explored further through interviews with senior managers at head offices in Japan. Plant tours and the collection of company documents provided additional data. Most case studies were generated from one to three days of interviewing. In a small number of important cases, however, we spent more time at the plants – up to ten or more person days, developing very detailed accounts. In addition to case studies, several interviews were conducted with, and documentation collected from, government departments, government sponsored agencies, employers' organizations and trades unions. We also collected large amounts of pertinent secondary data which allowed us to develop a 'macro' picture of trade and investment relations within which our case study plants could be located.

BACKGROUND: JAPANESE ELECTRONICS IN MALAYSIA

The electronics industry in Malaysia and elsewhere in ASEAN (Association of South East Asian Nations, which includes Singapore, Indonesia, Thailand and the Philippines) was established on a significant scale in the 1970s. In contrast to

Table I. Case plant characteristics

Plant	*Year established*	*Ownership*	*Products*	*Plant to plant relationships*
Assemblers in Japan				
MTV(J1)	1958	Japanese	HDTV, PDPTV, LCDTV, WTV	'Parent' of MTV(J2) and MTV
MTV(J2)	1967	Japanese	WTV, CTV	
HTV(J)	1969	Japanese	HDTV, WTV, CTV, projectors, monitors, CD roms	'Parent' of HTV
Assemblers in Malaysia				
MTV	1989	Japanese	CTV	Subsidiary of MTV Japan
HTV	1989	Japanese	CTV, VCR	Subsidiary of HTV Japan
Suppliers in Malaysia				
M Tubes	1990	Japanese	CRTs	Affiliate of MTV(J1) Supplier to MTV
C Tubes	1989	Taiwanese	CRTs	Supplies MTV and HTV
A Components	1989	Japanese	Resistors, tuners, VCR heads, disc drives	Supplies MTV and HTV
H Components1	1981	Japanese	DYs, FBTs, tuners	Affiliate of HTV(J) Supplies MTV and HTV
H Components2	1993	Japanese	DYs	Affiliate of HTV(J) Supplies HTV
N Components	1990	Japanese	Capacitors	Supplies HTV
T Containers	1980	Malaysian	Cardboard packaging	Supplies MTV and HTV
F Polystyrene	1983	Malaysian	Polystyrene packaging	Supplies MTV and HTV

Notes: HDTV, high definition TV; PDPTV, plasma display panel TV; LCDTV, liquid crystal display TV; WTV, wide screen TV; CTV, conventional colour TV; VCR, video cassette recorder; CRT, cathode ray tube; DY, deflector yoke; FBT, fly back transformer.

Korea, Taiwan and Hong Kong, it was developed almost exclusively by foreign investments, particularly via Japanese and US MNCs in search of cheap and plentiful labour. Malaysia was very successful in attracting a large share of this investment to its Free Trade Zones (FTZs – the first was set up in 1970), with an apparently stable government offering a range of tax and other incentives. At the end of the 1970s, 19 Japanese electronics subsidiaries had been established in Malaysia, compared with 16 spread across Indonesia, the Philippines and Thailand (Takayasu and Ishizaki, 1995). (Singapore had been more aggressive and quicker off the mark in its search for export-oriented foreign investment, and had attracted 43 Japanese electronics subsidiaries by the end of the 1970s.) Initially the emphasis in Malaysia was on the assembly of low value electronics components, mainly to be exported back to Japan for final assembly together with higher value parts produced in Japan: as late as 1986, 84 per cent of the output of the Malaysian electronics sector was accounted for by electronics components.

Then in the mid-1980s *endaka* (the high yen crisis) had the effect of making export oriented production in Japan all the more expensive. Combined with trade

sanctions (and threats of further trade sanctions) this led to Japanese companies locating production facilities in North America and Europe on a much bigger scale than had been the case in the past (Morris, 1991). It also contributed to a renewed and bigger investment push in Asian, and especially ASEAN, economies. In expanding the ASEAN presence, Japanese multinationals were taking further advantage of relatively cheap labour and therefore controlling production costs; at the same time they could use quotas and trade arrangements more favourable than those applying to exports directly from Japan (Guyton, 1995). A third important factor in the growth of Japanese FDI in Asia was the steady growth in demand for electronics goods across the East and South East Asian regions, and the perceived need to have a serious presence there.

Malaysia was well placed to take advantage of the further internationalization of production: it already had a significant electronics components base (creating a 'follow my leader' effect and offering economies of agglomeration); it was strategically placed geographically between Thailand, Singapore and Indonesia (good sources of further componentry), and the Malaysian government was continuing to pursue a policy of industrialization, with electronics at the forefront, based on the attraction of export oriented MNCs. Further, the Asian Newly Industrialised Countries (ANICs) of Singapore, Taiwan, Korea and Hong Kong, which were the favoured locations for Japanese foreign electronics subsidiaries during the 1970s, themselves experienced acute labour shortages and rising wage costs in the 1980s, and hence were often by-passed in favour of ASEAN (Wilkinson, 1994). Hence between 1985 and 1994, a further 201 Japanese electronics subsidiaries were added to the ASEAN (excluding Singapore) stock, 109 of them landing in Malaysia, whereas the ANICs (including Singapore) attracted only 83 new Japanese electronics subsidiaries (Takayasu and Ishizaki, 1995). At the same time the rapidly developing indigenous Taiwanese, Korean and Hong Kongese electronics companies were themselves becoming international players, further contributing to the growth of the electronics industry in ASEAN and elsewhere in Asia (Wilkinson, 1994). By the mid-1990s over 300,000 workers were employed in Malaysia's electronics industry, representing around 20 per cent year on year growth between 1986 and 1995 (table II).

In the late 1980s and early 1990s the investment push from Japan (and elsewhere) was in a wider range of activities. In particular there was a drive to locate final assembly and testing of goods in Malaysia, which in turn attracted more components companies (Takeuchi, 1993). By 1995 electronics components accounted for 42.9 per cent (in 1986 it was 84 per cent) of the Malaysian electronics sector's output, the rest being consumer electronics (25.2 per cent) and industrial electronics (31.9 per cent). As a whole, electronics accounted for over half of Malaysia's manufactured exports in 1995: it represented the most important contribution to Malaysia's success in exceeding the growth, value added, employment and export targets of the 1986–1995 industrial master plan (Ministry of International Trade and Industry, 1996).

In the late 1990s around a half of all electronics exports from Malaysia are destined for the Asian region, with other ASEAN countries and Japan being the most important markets. The USA and Europe take up all but around 10 per cent of the remainder. In the consumer electronics sector, the focus of our research, 44.1 per cent of exports in 1995 were to other Asian countries, including 17.4 per cent of the total to ASEAN and 13.5 per cent to Japan. The USA took 29.6 per cent

Table II. Malaysian electronics industry: employment, output and exports

Year	*Employment ('000s)*	*Output (RM billion)*	*Exports (RM billion)*
1986	57	6.5	7.1
1987	89	8.9	9.2
1988	106	12.2	13.0
1989	123	15.9	17.9
1990	144	20.3	23.1
1991	171	26.1	30.4
1992	204	32.2	34.6
1993	231	42.1	46.7
1994	278	56.4	66.4
1995	313	71.0	85.0

Sources: Malaysian Industrial Development Authority (1996); Ministry of International Trade and Industry (1996).

Table III. Offshore and domestic production of CTVs and VTRs by Japanese electronics companies 1988–1997 (millions of units)

	1988	*1989*	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*
Offshore production										
CTVs	15.9	17.0	19.9	22.7	23.2	27.5	33.0	35.5	43.6	38.5
VCRs	5.3	5.3	7.3	10.1	10.7	14.2	21.9	20.1	26.6	25.4
Domestic production										
CTVs	13.2	12.6	13.2	13.4	12.0	10.7	9.4	7.9	6.5	6.7
VCRs	31.7	32.0	31.6	31.0	23.4	20.2	19.2	16.1	12.7	12.6

Source: Electronics Industries Association of Japan.

and Europe 16.1 per cent (Ministry of International Trade and Industry, 1996). Interestingly, Japan is well on its way to becoming a net importer of some categories of electronics goods (including CTVs and VCRs – the focus of our research), which are frequently assembled in Japanese subsidiaries in ASEAN.

The rise of 'Japan–Asia' (a popular term referring to Japanese technology plus cheap Asian labour) in the 1980s and 1990s gave rise to a Japanese concern about a possible 'hollowing out' (*kudoka*) of Japanese industry. However, there is not (yet at least) any compelling evidence that this has occurred. Within the electronics sector, the number of CTVs and VCRs produced by Japanese companies overseas increased enormously between 1988 and 1997, while domestic production declined sharply (table III). However, while exports of finished consumer goods from Japan declined, exports of (high value) electronic components and devices more than made up the shortfall (table IV).

The net effect of international restructuring on employment levels appears to have been a large growth in off-shore facilities, and a marginal decline at home (table V). The reason for the sustainment of Japan's domestic electronics industry is that the rise of Japan's Asian production networks has been associated with an

Table IV. Exports of electronics from Japan 1988–1997 (billions of Yen)

	Consumer electronic equipment		*Industrial electronic equipment*		*Electronic components and devices*		*Total*
	Yen bn	*% of total*	*Yen bn*	*% of total*	*Yen bn*	*% of total*	
1988	2,208	24.2	2,988	32.8	3,924	43.0	9,120
1989	2,287	22.7	3,192	31.6	4,617	45.7	10,096
1990	2,618	23.8	3,443	31.3	4,933	45.4	10,994
1991	2,696	23.9	3,508	31.1	5,067	45.0	11,272
1992	2,258	20.0	3,692	32.6	5,361	49.8	11,310
1993	1,752	16.3	3,430	31.9	5,564	51.8	10,746
1994	1,542	13.9	3,144	28.3	6,419	57.8	11,104
1995	1,313	11.3	2,944	25.4	7,340	63.3	11,598
1996	1,283	10.7	3,031	25.4	7,638	63.9	11,952
1997	1,393	10.2	3,803	27.8	8,482	62.0	13,677

Source: Electronics Industry Association of Japan.

Table V. Number of employees of Japanese electronics companies in Japan and offshore 1992–1997 (thousands)

	1992	*1993*	*1994*	*1995*	*1996*	*1997*
Japan	1208	1151	1108	1102	1075	NA
Offshore	541	570	647	766	807	917

Source: Electronics Industry Association of Japan.

international division of labour and technology, entailing an increased focus on high value adding activities at home, activities on which Asian production networks are dependent (Hatch and Yamamura, 1996). Hence while the growth of Malaysia's electronics industry has been remarkable, Malaysia's trade deficit with Japan in electronics goods increased from US$0.5 billion in 1985 to US$4.5 billion in 1995. Equally worrying for Malaysia's industrial planners could be that the deficit with Japan in industrial machinery, much of which is used to manufacture electronics goods, rose from US$1.5 billion to US$8.9 billion over the same period (Takayasu et al., 1998). These figures reflect the fact that while Japanese electronics has internationalized, Malaysia and other Asian countries have experienced only a limited advancement in their industrial structures.

The Case Study Plants

Our case study plants are reflective of the broad developments described above, both in terms of location and rationale. The three assembly plants in Japan were established between 1958 and 1969 to produce black-and-white and colour TVs. As conventional CTV production was increasingly moved off-shore in the 1980s and 1990s, two of these plants (MTV(J1) and HTV(J)) shifted their focus to the production of higher value and newer products. MTV(J1) focused on HDTV production, and design and manufacturability work on LCDTV and PDPTV. HTV(J) focussed on HDTV and the high value end of the CD-ROM market, and was looking to add other high value non-TV products to its portfolio. MTV(J2) con-

tinued to produce conventional CTVs for the domestic market, and more recently added wide screen TVs. Its future was, as we shall see, under question.

Among the Malaysian plants, three suppliers were established between 1980 and 1983. H Components1 was established primarily to service its affiliate HTV's existing Singapore assembly plant, while T Containers and F Polystyrene (the only Malaysian owned plants in our sample) were dedicated to supplying packaging materials to electrical and electronics plants in Malaysia. (Indigenous company participation in the networks we studied was minimal, and limited largely to packaging, metal stamping, some plastic moulding, and labels and nuts and bolts. This is generally the case in the electronics industry in Malaysia as identified by MITI.) Each of these three plants grew in size with the expansion of the electronics industry in South East Asia through the 1980s and 1990s. All the other case plants, including MTV and HTV, were established between 1989 and 1993. MTV and HTV were established in Malaysia because of cheaper production costs and the availability of componentry in the region. The component suppliers, on the other hand, were establishing in Malaysia around the same time in order to serve these (and sometimes other) final assembly plants.

MTV produces almost solely for export, being set up specifically to serve Asia (including Japan) and Oceana (sister plants in Europe and North America serve those markets). There is a separate MTV assembly plant with a small capacity only a few miles away (not studied). This plant was set up in 1966 specifically for the Malaysian market, and has continued to play this role into the 1990s. MTV also maintains small scale TV assembly facilities, known as 'mini-M plants', within the markets of Thailand, Taiwan and the Philippines. On the other hand CTV production at HTV constitutes less than a third of total output (all for the Malaysian and ASEAN markets), while VCR production is increasingly for the world market place. The VCR world market appears to be in terminal decline, and there is a problem of worldwide over capacity. HTV's response has been to close its British and German plants (in 1995 and 1996). Its US plant has limited capacity and this will not be increased. Its VCR plant in Japan – which was described to us as far more efficient than the Malaysian plant but too expensive to run – is now under threat of closure. The component suppliers typically serve a range of assemblers, including MTV and HTV, in Malaysia and elsewhere in the region, and to some extent each other. C Tubes is the exceptional plant in our sample, having neither a Japanese nor a Malaysian parent. This Taiwanese tube manufacturer enjoys 48 per cent of the Malaysian market for CTV picture tubes, and 52 per cent of the Malaysian market for display monitor tubes. Its CRT know-how was originally provided by Toshiba in the 1970s. Today C Tubes is one of the major players in picture tube markets in Pacific Asia and Europe.

DIVISIONS OF LABOUR

In terms of Gereffi's (1996a, 1996b) commodity chain framework, CTV and VCR production are examples of producer driven rather than buyer (retailer) driven chains. There are signs that this may be beginning to change for the low value end of the CTV market. For instance we studied one Hong Kongese CTV manufacturing plant in China (not reported here) which produced small CTVs to specifications provided by overseas buyers (retailers who sold under their own brand

names). There could be important implications of this potential shift, though these will be the subject of another article. The commodity chains described in this paper were driven by the two big Japanese assemblers. Within our sample, HTV(J) was experimenting with purchases of some small screen low value CTVs from OEM manufacturers and badging them. If this policy were to be extended then the role of HTV in Malaysia (and other H plants around the world) in CTV production could come under threat. The sub-contracting of (what are increasingly) low value adding activities would not, however, change the central role of the Japanese corporations in the chain.

Examination of plant activities in detail enables us to put flesh on the bones of the notion of an international division of labour, and highlights the situation and dependencies of Malaysian plants within the Asian production networks of Japanese electronics MNCs. Divisions of labour are three-fold: the product-to-product division of labour; the component-to-component division of labour; and the location of innovation. The latter category includes both product and process innovations.

Product-to-Product Divisions of Labour

The final consumer products deriving from the production networks under analysis are CTVs and VCRs. However, the market for these products, especially CTVs, is of course differentiated. For instance in Japan in 1998, a small conventional CTV could cost US$100 or less. But a TV set with high definition capability would cost over US$2000, a TV set incorporating a 15-inch LCD screen would retail for around US$1400, and a TV incorporating a PDP US$80,000. Differences in price are related in part to the greater amount and/or sophistication of componentry, and also to innovativeness of products and small production runs. (Prices will reduce as markets expand and as production processes are perfected.) The point here is that different products are made within different plants, with, as we shall see, some significant implications for work organization and human resources.

Two of the assemblers located in Japan have shifted their product mix towards the highest value end of the continuum (HDTV, etc. – see table I). The third (MTV(J2)) produces conventional sets, though even here the focus is on the higher value end of the conventional TV spectrum – over half of output is of wide screen TVs, and the smallest square screen TVs made are 21-inch. MTV in Malaysia, on the other hand, has the capability of producing conventional CTVs between 14 and 29 inches, but is focused on smaller screen sizes (90 per cent of output is CTVs with screen sizes of 21 inches or less). At HTV in Malaysia, *all* CTV output is 21-inch or less. And while HTV's VCR production seems destined to serve most of the world, most VCRs are already standardized mature products with an uncertain future in the face of competition from newer recording devices such as digital video disc (DVD) players. Indeed an H plant in Japan (not visited) was in the process of winding down VCR production, and head office was considering shifting the same plant's video camera production to Malaysia, on the grounds that video cameras were well on the way to becoming 'commodity products' too.

The product-to-product division of labour is, then, quite clear: standardized mature products are made in Malaysia, new and more sophisticated products are made in Japan. Malaysia is likely to produce some of the higher value products

in the future – at the time of our study there was talk of shifting HDTV production from MTV(J1) to MTV Malaysia, for instance. However, the plan was to do so only after mass markets and therefore mass production became feasible, and when production processes had been standardized at the mother plant in Japan. The suggestion here of a cycle of innovate in Japan–mass produce in South East Asia, is elaborated on below.

Component-to-Component Divisions of Labour

Interviews with components manufacturers confirmed that more and more electronics componentry was being made in Malaysia (and other ASEAN countries), in part because of cost considerations, and because the assemblers wished to increase their local content ratios so that their goods became defined as 'Malaysian' and therefore treated more favourably in the domestic and many export markets. But as with the two final assembly plants in Malaysia, in all the components companies we studied, mass production was underway, with relatively little product variety, and processes were highly standardized. The higher value components were mostly imported by the assemblers from Japan or the Asian NICs (particularly Singapore). By value, HTV imported 28 per cent of componentry from Japan and 14 per cent from Singapore; 44 per cent was sourced within Malaysia. MTV showed signs of more intensive localization of supplies with 55 per cent from Malaysia, 29 per cent from Singapore, and only 3 per cent from Japan. In both cases the 'Malaysian content' was mostly from other Japanese (often affiliate) companies, and sometimes Korean or Taiwanese owned companies. Content from Malaysian-owned companies was less than 5 per cent.

While these figures suggest a significant localization of supplies, there are two serious qualifications. Firstly, the components supplied to the assemblers are typically made up of sub-components, which are often sourced outside Malaysia. For instance, H Components1 and H Components2 sourced their deflector yoke cores (the highest value part of the yoke) from Japan; and N Components, which makes capacitors, imported capacitor foils, again the highest value input, from Japan as well. Among the Japanese owned component makers studied, 40 per cent of sub-componentry imported from Japan was typical. Secondly, the componentry made in Malaysia is for *conventional* CTVs – the component localization which is occurring is therefore of the standardized mature type. The most important example here is with regard to cathode ray tubes (CRTs). The CRT is the highest value component in a conventional TV set, and both MTV and HTV source the bulk of these within Malaysia. However, CRTs are a mature technology, they have no place in LCD and PDP TVs, and it is likely that CRT production may decline in the future. The cycle of innovate in Japan–mass produce in Malaysia therefore appears to apply in the components as well as finished goods sectors.

The Location of Innovation – Products

Of crucial importance in considerations of international divisions of labour is the location of innovation. Here we discuss product innovation, then process innovation, though we do recognize (following Hobday (1998) and Kenney and Florida (1992)) the unity of design and production. Both MTV and HTV undertake limited design work in Malaysia. HTV employs around 30 in R&D; MTV employs around 80, including 24 graduate engineers, some of whom are Japanese expatriates. Although the significance of this work should not be understated, it is

important to emphasize that they are not pushing back the frontiers of media technology. Rather, they are modifying basic chassis designs sent from Japan in order to reduce the complexity of componentry and to improve manufacturability. At MTV, suggested changes to designs are constantly communicated electronically to the Japanese mother plant (MTV(J1)), which provides guidance and advice. The resulting chassis modifications have been used in the Malaysian plant, and also in the group's 'mini-M' plants in the region, confirming the status of MTV as the most important group company in Asia outside Japan. ('Mini-M' plants were established in four South East Asian countries in the 1960s when import substitution policies were deployed. They remain, today, as simple final assembly plants – only the sources of some componentry has changed.)

MTV(J1) employs over 500 R&D engineers and technologists, many with PhDs, devoted to TV innovations. More fundamental product research is of course carried on there, and it should be pointed out that manufacturability design work on more complex chassis, including for HDTV which embodies far greater componentry, remains firmly in Japan. The picture at HTV was similar with limited design work undertaken in Malaysia, and more fundamental work in Japan: the shifting focus to CD-ROMs and other computer peripherals at the Japanese VCR plant was justified on the grounds that these were new products which 'require a close relation between design development and manufacturing development', and which are therefore 'difficult to move overseas'.

Among all the supplier companies studied, a total of less than ten people were engaged in any form of product design work, though two companies (A Components and M Tubes) said they were considering introducing design teams in response to the needs of companies like MTV: they explained that designers in buyer and supplier companies really need face to face contact.

The Location of Innovation – Processes

A first point to note here is that the bulk of capital equipment and machinery is imported – mostly from Japan, and in the case of C Components from Taiwan. (Rasiah (1994) did document a degree of growth in local sourcing of production machinery in the 1980s, but we saw little evidence of this in the plants we studied. We came across one case of an automated warehouse made in Malaysia, but the great bulk of the expensive automated equipment and machinery was made in Japan.)

The second important point is that a huge amount of the continuous improvement activity for which Japanese firms are famous has been carried out in Japan at 'mother' and 'sister' plants prior to the export of the process. This applied to the assemblers *and* the Japanese (and Taiwanese) suppliers. At the extreme, the Japanese parent plant designs a whole production process, fine tunes the machinery and equipment, and runs the process under the scrutiny of industrial engineers with select Japanese labour to establish optimum methods, standard times, maintenance regimes, etc. The whole process, together with detailed production manuals, is then transferred overseas. It is on this basis that Kenney et al. (1998) distinguish between 'learning factories' and 'reproduction factories'. Of course in practice there will be some differences in the processes established overseas, not least because the levels of automation found in Japan are not likely to be wholly replicated – the economics of robot assembly (common in electronics production in Japan) may work in Japan but not Malaysia. The principle is, however, clear:

design the process in Japan; productionize and standardize in Japan; export the finely tuned production process. For instance at MTV(J1) we observed the HDTV production facility and the *kaizen* work on the complex chassis. Over the previous three years the time taken to produce a chassis had been reduced from 931.1 minutes to 176.6 minutes, and the current target was to go below 150 minutes. If and when HDTV production is shifted overseas (including to Malaysia) the step changes in productivity will have been achieved, and any process improvements made there are likely to be minor.

WORK ORGANIZATION

Differences in the organization of work in the plants largely reflected the position of the plants in the international division of labour. Hence in Malaysia in most parts of most plants there was a minute division of tasks across production lines. Work cycle times for most assembly, testing and quality checking tasks were around 20 to 30 seconds. This is the case for over half of those employed in our sample of companies. In component and TV assembly plants, on-the-job training for as little as a few days precedes taking a job independently on the line. In the more highly automated plants – tubes and packaging – the work is more a case of machine minding, with much routine and heavy loading and unloading, and some manual packaging of finished goods ready for shipment. Work is more skilled in tubes plants than elsewhere, on-the-job training lasting for between one and three months depending on the precise job, with skills and abilities continuing to develop over a number of years. Employees in these plants spend some of their time loading and unloading heavy componentry and materials into automatic machines, but as well as strength and stamina they need some diagnostic ability which enables them to recognize when an automatic process may go 'off-cock'. A machine breakdown or a deviation from specification can prove costly, and knowing when to intervene is an important skill. The local description of tubes plant work is, however, 'dirty and dangerous' (certainly the 'dirty' characterization is accurate; we did not gather evidence on 'danger'), and Malaysian workers are difficult to recruit. More skills and training are also entailed in the automated sections of the component and CTV assembly plants. For instance, in some plant sections there is automatic insertion or mounting of components onto printed circuit boards. Here, operators have to load magazines of components, unload finished goods, and monitor the machinery. Some degree of understanding of the machinery is useful, and some operators are given minor programming skills; more technicians are employed in these areas too.

A regimented and highly disciplined workforce has been well documented in Japanese plants in the UK and USA (Delbridge et al., 1992). Discipline is similarly imposed on the workforce in Japanese electronics plants in Malaysia, for instance with regard to time keeping, attendance and the wearing of company uniforms. Displays of production targets, output, and defects are commonly used, typically at the level of work teams, and these are up-dated hourly, or in some cases in real time. The detailed attention to quality is reflected in most plants in an individual fault tracing capability, though quality feedback was sometimes at the level of teams rather than individuals for fear of alienating workers. Such detailed monitoring and measurement of worker performances has also been

documented in Japanese (and other) plants in the UK and elsewhere (Sewell and Wilkinson, 1992).

A minute division of labour and short work cycles on assembly lines can be an isolating experience, but workers are typically organized into 'teams', with a 'team leader' whose job it is to constantly seek improvements on performance against output and quality targets within specified manning levels. The targets are set by industrial engineers and production managers, and in some plants discussions about efficiency ratios in Malaysia compared with Japan were commonplace. In many cases team leaders would brief their members at the start of the shift, and they tried to encourage a 'customer' ethos – the downstream team being the upstream team's customer.

Job rotation is sometimes practised, but typically is limited to workers developing a capability in two or three different assembly tasks within a line, except for a small number who act as floats or utilities to fill in for absentees under conditions of tight manning.

What workers do routinely in their jobs, then, appears quite limited. But what about the employee involvement activities – quality circles, *kaizen* teams and the like – for which the Japanese are famous? All but one of the ten companies studied (and including the Taiwanese and Malaysian owned plants) had attempted at some time to introduce small group activities, but almost all had either failed miserably or were quite limited in their spread and life-span. Our data do not allow us to judge to what extent this was down to worker disinterest or recalcitrance, or to management's own lack of commitment. Some Japanese managers interviewed blamed the workers – 'they don't share the Japanese culture', 'they're not so well educated', etc. However, the fact that most of the production processes had been seriously *kaizened* in Japan before being exported to Malaysia probably had something to do with it: the whole emphasis was on achieving levels of output and quality already established in Japan rather than being inventive. No doubt the high labour turnover in these plants (see below) was another factor constraining the investment in improvement activities.

One exception to the '*kaizen* in Japan, transfer to Malaysia' rule we came across, an exception which contradicts the 'Malaysians are not capable' view, was at A components. Here local line leaders and supervisors were involved in a *kaizen* programme based on a recombination of assembly tasks in conjunction with redesigned production machinery organized in small 'cells'. Managers claimed big productivity and quality improvements which exceeded standards in Japan. Managers from Japan were due to visit the Malaysian plant to consider transferring the process innovation back to Japan. An expatriate Japanese manager at the plant said it was easier to make such changes in the Malaysian plant because it was more authoritarian: consensus decision making and associated company politics were obstacles in Japan.

Interestingly, MTV's sister plant in Japan (MTV(J2)) was experimenting very much along the same lines as A Components, in this case as part as part of a desperate attempt to ensure its survival in the face of higher costs and the implicit threat of the transfer of its activities to Malaysia, through raising labour productivity. A document written by the plant's manager and circulated among staff describes average work cycle times on some lines of 15 seconds. Experiments showed that recombining tasks to create one minute cycles and using the feedback of buzzers and lights to signal to operators when the end of the target cycle was

imminent led to productivity improvements of between 40 and 50 per cent. The document presents this experiment as an example of a 'soft' processing technology 'that is beyond the capability of the South East Asians'. This may, however, be wishful thinking. At the time of our visit, 40 of the plant's managers were located at sister plants overseas (in Europe and North America as well as Asia) charged with the task of transferring 'best practice'.

The Malaysian plants under study are, then, engaged in standardized, mature mass production, and unsurprisingly work on the shopfloor is mostly repetitive and more demanding of concentration and diligence than of skills and intelligence. (This is more or less true for MTV(J2) as well, though its output was at the higher value and newer end of the conventional TV spectrum, giving a little more opportunity for process innovation.) Opportunities for employee involvement beyond meeting output and quality targets are quite limited. This is not necessarily technologically deterministic; the experiments described above should put us on our guard in that regard because they demonstrate the possibility of continuing employee involvement in improvement activities after major process innovations have occurred, and point to some scope, however limited, for modifications to work organization under mass production conditions. However, international divisions of labour by product, component and innovation mean even these exceptional plants, to use Kenney et al.'s (1998) terminology, remain quite firmly 'reproduction' factories rather than 'learning' factories. Only a shift in the international division of labour (and there was no evidence this might occur in the near future) would change this position. The main point here is that standardized mature production processes have been exported from Japan with the aim of replicating Japanese levels of efficiency at lower costs. Improvements through redesign of processes are secondary to the requirement for cheap unskilled labour.

Within our sample, MTV(J1) and HTV(J) produce the most innovative, complex and highest value goods, and this is reflected, as described above, in the large numbers of R&D personnel employed at MTV(J1). The R&D associated with HTV(J) is located separately in Japan, but has very close links to the manufacturing plant. At both plants armies of industrial engineers and supervisory staffs trained in the methods of process improvement worked to productionize and fine tune processes. Shopfloor workers do engage in short cycle, repetitive tasks, but the 'experimental' nature of many plant activities means more frequent job changes and significant 'multi-tasking', and employee input to process improvement is expected. This contrasts with the situation in all the Malaysian plants studied (except partially for A Components) where job rotation is restricted to a small numbers of workers who can 'fill in' for absentees. The need for flexibility was simply limited in a situation of mass production of highly standardized goods. In Japan there was also more scope for significant formal employee involvement activities. The evidence was of a breadth and depth of participation by a significant majority of workers in suggestion schemes, quality circles and *kaizen* teams which was not found in the Malaysian plants.

HUMAN RESOURCES MANAGEMENT AND DEVELOPMENT

If plant roles within the international division of labour have clear implications for the jobs which people do and the organization of work, the same holds true

for human resources practices. Put simply, standardized mature mass production plants with little product variety demand different types of skill and different levels of employee involvement compared with experimental plants, and therefore different types of employee. However, at the beginning of this article we noted labour as the commodity which talks back. Hence after a description of human resource practices, there will be a commentary on the active role of labour at the plants.

Recruitment, Selection and Retention

When MTV established in Malaysia in 1989, the country was still coming out of a late 1980s recession. Six thousand applicants applied for the first 300 jobs on offer. MTV focused on 17 year old high school leavers with reasonably good educational credentials, and used interviews and psychological tests to try to pick out 'team players' and those with 'potential for growth'. As employment growth at the plant slowed through the 1990s and the plant 'settled', potential for growth became less salient. At the same time the labour market situation changed rapidly as Malaysia boomed in the 1990s, and manufacturers competed with each other for scarce labour. A pact between Japanese companies not to poach each other's labour did little or nothing to resolve the labour scarcity problem. Hence high selectivity could not last for very long even if MTV wanted this. The response of plants, including MTV, to the tight labour market has been to reduce expectations regarding educational requirements – at some plants down to basic literacy and numeracy – and to seek out labour from ever more remote rural areas (industrialization in Malaysia has been focused around the Kelang Valley, Johor Bahru and Penang). One plant (H Components1) described how they send personnel staff out to the *kampongs* (rural villages) to recruit what they can on the spot. Brief interviews are conducted and workers are selected, then the next day a bus is sent to collect the new recruits. H Components2 was set up, in 1993, in a rural area, specifically because of recruitment problems at H Components1. But that rural area (near Ipoh) has since increasingly industrialized, and the catchment area is now beginning to widen again.

Some plants have also become dependent on foreign labour, especially from Indonesia and Bangladesh. The packaging and tubes plants we studied have a 20 to 40 per cent dependency on foreigners. Interestingly, managers at these plants said they actually preferred foreigners because they are more or less captive for the three years or so of their contracts – legally they cannot job hop, and training efforts are less likely to be wasted. (Interestingly, the greatest worker skills demands among the Malaysian plants were here, yet the workers were on average the most poorly educated.)

Many Japanese managers complained to us about the lack of loyalty, laziness, and rising wage bills associated with Malaysian workers (some put these perceived characteristics down to 'Malaysian culture', others recognized the labour market circumstances might have a role to play). Comments that 'we'd be better off nowadays in Indonesia or Vietnam' were not uncommon, though none revealed to us any immediate plans for relocation. Turnover was typically 3 to 4 per cent per month, with peaks on the receipt by workers of annual bonuses; turnover rates were even higher than this among Malaysian workers (but not for immigrant labour) in the 'dirty and dangerous' tubes and packaging plants.

Selection and retention in the Japanese plants, on the other hand, were relatively unproblematic affairs. The typical recruit for the most basic operator jobs

would be 18 and fresh from technical high school with some basic technical knowledge. The selection process is rigorous and includes personality checks. Annual turnover at each of the three plants was 3 per cent or less, and around a half of this was accounted for by female turnover associated with marriage and/or childbirth. In the 1980s recruitment was less easy, but plant restructuring had meant a gradual reduction in the size of workforces in the 1990s, and this combined with the rise in unemployment associated with Japan's recession had allowed selectivity *and* virtually eliminated any retention concerns.

Training and Development

In the Malaysian final assembly and components plants a couple of weeks induction and on-the-job training (OJT) for operators was typical. After this, operators would take their place on the line proper. In the tubes plants, and in some of the highly automated sections of components assembly and final assembly plants, one to three months OJT, depending on the specific task being trained for, was used. Further training – mostly in-house – was available for those identified as having potential for promotion to line leader and supervisor, and some companies, as a part of their paternalistic provision (see below), offered limited non-work related educational opportunities, such as foreign language classes. At the three Japanese plants, recruitment was followed by a two weeks induction process, then six months on- and off-the-job training. Workers' capabilities in rotating between jobs and in engaging in continuous improvement activities were clearly related to this greater emphasis on skills formation.

Survey evidence provided by Takeuchi (1999) would suggest our own findings may not be untypical of Japanese-owned plants in Malaysia. This study reports that Japanese-affiliated companies in Malaysia and other ASEAN countries implement 'Japanese-style' skills development methods (especially job rotation and OJT) but that they are modified to reduce 'scope' in terms of both the number of job categories prioritized, and in the range of skills required in employees. Variations between Japanese subsidiaries in ASEAN related to product diversity and, as in our cases, production systems.

Pay and Promotion

In Malaysia starting salaries for operators were typically around RM430 per calendar month for a 45 hour week, with two months pay as an annual bonus. This produced an annual income of around US$1900. Peaks and troughs in demand were met by the use of overtime; temporary workers were rarely used, and would in any case have been difficult to recruit in the labour market circumstances. High turnover of staff was also useful here. Output down turns could to some extent be accommodated without having to resort to layoffs simply by freezing recruitment.

Most plants gave seniority increments of around RM50 per year of service. Some paternalistic benefits were also provided, including subsidized dormitories, free bussing for employees commuting from their rural *kampongs*, meal vouchers, and medical and recreational facilities. In one case (MTV), workers who spent several years at the plant were eligible for housing loans at favourable interest rates.

The three Japanese plants paid much higher salaries of course. Starting pay for an operator was around US$30,000, rising to US$45,000 with seniority and merit

increments, and US$50,000 on promotion to team leader (which often occurred after five years service). Paternalistic provision, as one would expect, was extensive and long established in all three companies. It is unlikely, however, that the use of paternalistic provision in Malaysia is a result of 'Japanese' management. Managers interviewed told us that it was related to the necessity of meeting some of the basic needs of a young workforce from a rural background, often many miles from home, and to the underdevelopment of a state welfare system in Malaysia. Without a degree of paternalistic provision, recruitment and retention problems would have been all the more difficult. Further, the Taiwanese-owned tube maker in our sample did at least as much on the company welfare front as any of the Japanese companies, and Keenoy and Abdullah (1995) similarly reported that American electronics plants in Malaysia were equally paternalistic as Japanese plants.

Promote-from-within policies were universal in Japan and Malaysia, in Malaysia's case reflecting the difficulty of recruiting team leaders and supervisors from outside, partly as an attempt to bond workers to the company, and partly as a consequence of the 'no-poach' agreement between Japanese companies. As mentioned, however, the no-poach agreement did not prevent job hopping, and the attempts of companies to create stronger internal labour markets were having only limited success. Success on this front in the context of a tight labour market might be likely to depend on higher wages and benefits: increasing such costs would contradict the purpose of locating in Malaysia in the first place.

Industrial Relations

In seven of the ten plants studied in Malaysia there was no union, just limited consultation with worker representatives via the personnel department. In fact electronics companies in Malaysia have 'pioneer' status, and union activities among them are severely restricted. As in Singapore (Deyo, 1991), this is a case of the state helping to control labour on behalf of multinational capital in a situation of dependent development. Nonetheless, the Electrical Industry Workers Union (EIWU) has been knocking on the doors of electronics companies ever since the 1970s, and has frequently disputed whether companies should be defined as 'electronic' or 'electrical' (see Smith (1994) and Abdullah (1992) for detailed analysis of union activity in Malaysian electronics).

One such company in our sample was H Components1, which the EIWU tried to organize following an illegal strike in 1991. The company sacked all the workers, then re-recruited most of them on condition they accept an in-house union ('in-house unions' are modelled on Japanese enterprise unions and are promoted by the Malaysian government as a means of establishing 'harmony' in employee relations). In 1994 the EIWU then tried to organize HTV. This time the company went to court, which ruled that HTV was indeed an electronics company exempt from union recognition. They now plan to introduce an in-house union. H Components2 established an in-house union in 1996 to pre-empt EIWU interest. MTV is the one plant in our sample to recognize an independent union. The EIWU successfully gained recognition there in 1993. MTV has not faced any industrial action, but the union does seem to have some influence on pay and conditions (though we could not unravel this influence from labour market effects). Overall, however, the EIWU remains relatively weak. Its membership grew from around 10,000 to 25,000 between 1986 and 1996 (EIWU, 1996) but this compares with a more rapid growth in employment in the electronics sector over the same period

(see table II), and most of their representation is in any case in the white goods sector.

Workers at the three plants in Japan belonged to enterprise unions, which were closely aligned to their companies and worked closely with personnel departments. Union representatives were often supervisors, contributing to the blurring of the distinction between worker representation and management. Bargaining was restricted largely to issues of wages and conditions, with little or no challenge to managerial prerogatives regarding labour deployment, overtime, or other 'operational issues'. In their role as team leaders and supervisors, union representatives were also involved in employee counselling and development: at MTV(J1) and MTV(J2) senior shopfloor staffs were 'big sisters' or (for men) 'senior companions' who would deal, for their juniors, with work related problems and often non-work personal and family problems too. This was part of the attempt to 'bond' workers to their employing organizations.

CONCLUSIONS

Shopfloor organization and related human resources management and development practices must *increasingly* be understood in relation to the international production networks associated with specific industries. As Gereffi (1996a, p. 430) puts it: 'globalization diminishes the influence of national origins'. In the case of the electronics industry, or more specifically the consumer electronics and associated components industry, Malaysian plants occupy a particular space within the developing commodity chain. Decisions by the major players in the industry about product-to-product and component-to-component divisions of labour, and the location of product and process innovation, have led to the establishment of plants in Malaysia which: produce mature goods which compete in world markets mainly on price; engage in relatively low value activities, particularly mass assembly; do limited product design work; and engage only in highly limited ways in process innovation.

It is in this context that we can understand the limited demands on the skills of shopfloor workers in Malaysia and the emphasis on work force discipline to achieve reasonably high productivity and therefore control costs. Independent labour organization is largely denied workers by the state in order to preserve managerial prerogatives, though workers have been given some degree of power (to 'vote with their feet' by job-hopping) by an extremely tight labour market in the 1990s. In Elger and Smith's (1998) terms, the 'mandate' of management is not easily challenged by workers' 'voice' (though employers have to be on their guard against encroachment by the EIWU), but 'exit', in the Malaysian labour market circumstances of the 1990s, has made management problematic. In sum, the activities undertaken in Malaysia are mature and productionized, and they are applied to a weakly organized and socially detached workforce. As Kenney and Florida (1994) found in their study of Japanese maquiladora plants in Mexico, the labour process requires cheap labour, does not demand involvement, and high labour turnover can be tolerated so long as it does not push up labour costs.

The Malaysian government is fully aware of the limitations of the electronics industry, and has established ambitious plans to attract more and more high value added activities, and to encourage the development of indigenous Malaysian elec-

tronics companies capable of competing in world markets with Japanese, Korean and Taiwanese owned companies. Malaysia has economies of agglomeration on its side, and there are large scale initiatives to improve the educational infrastructure and therefore the supply of well educated engineers and technologists. If successful, we would expect to see major changes in patterns of work organization and human resources development and management. However, there are huge problems to be overcome. The generation and development of indigenous electronics companies is acknowledged by the government to be extremely slow, and may be increasingly difficult precisely because of the international division of labour: de-packing and modifying technology is not easy with an ever more complex division of activities (Morris-Suzuki, 1992). Attempts to attract higher value investments from the multinationals, for the moment at least, appear to rub against the low cost rationale for present investments. Furthermore, Malaysia is adjacent to the more highly developed newly industrialized country, Singapore, with whom it may have to compete for better quality investments. Malaysia is also adjacent to Indonesia, which has much lower wages than Malaysia, and a huge reservoir of labour. Malaysia sits uncomfortably between these two, and the danger is that, agglomerations not withstanding, rising production costs remove the rationale for an electronics industry in the country.

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REFERENCES

Abdullah, R. S. (1992). 'Management styles and strategies and employee responses in Malaysia: a study of management and industrial relations styles of US and Japanese multinational companies in the Malaysian electronics industry'. PhD thesis, University of Wales, Cardiff.

Abo, T. (1994). *Hybrid Factory: The Japanese Production System in the United States*. Oxford: Oxford University Press.

Abo, T. (1995). 'Japanese electronics assembly plants in East Asian region: a comparative study of "hybrid factories" in East Asia, the US and Europe'. Paper presented to the 12th Annual Conference of Euro-Asia Management Studies Association, SDA-BOCCONI-ISFSAO, Milan, 8–11 November.

Cole, R. E. (1973). *Japanese Blue Collar: The Changing Tradition*. Berkeley, CA: University of California Press.

Dedoussis, V. (1995). 'Simply a question of cultural barriers? The search for new perspectives in the transfer of Japanese management practices'. *Journal of Management Studies*, **32**, 6, 731–46.

Delbridge, R., Turnbull, P. and Wilkinson, B. (1992). 'Pushing back the frontiers: management control and work intensification under JIT/TQM factory regimes'. *New Technology, Work and Employment*, **7**, 2, 97–106.

Deyo, F. (1991). *Beneath the Miracle: Labor Subordination in the New Asian Industrialism*. Berkeley, CA: University of California Press.

EIWU (Electrical Industry Workers' Union) (1996). *Report of the Executive Council, 1993–1996*. Malaysia: EIWU.

ELGER, T. and SMITH, C. (1998). 'Exit, voice and "mandate": management strategies and labour practices of Japanese firms in Britain'. *British Journal of Industrial Relations*, **36**, 2, 185–207.

GEREFFI, G. (1996a). 'Global commodity chains: new forms of coordination and control among nations and firms in international activities'. *Competition and Change*, **4**, 427–39.

GEREFFI, G. (1996b). 'Commodity chains and regional divisions of labour in East Asia'. *Journal of Asian Business*, **12**, 1, 75–112.

GUYTON, L. (1995). 'Japanese FDI and the transfer of Japanese consumer electronics production to Malaysia'. *Journal of Far Eastern Business*, **1**, 4, 63–97.

HATCH, W. and YAMAMURA, K. (1996). *Asia in Japan's Embrace: Building a Regional Production Alliance*. Cambridge: Cambridge University Press.

HOBDAY, M. (1998). 'Acquiring technology: East vs. South East Asian systems of innovation'. Paper presented to the ESRC Pacific Asia Programme Conference, London, FCO.

KEENOY, T. and ABDULLAH, R. S. (1995). 'Japanese managerial practices in the Malaysian electronics industry: two case studies'. *Journal of Management Studies*, **32**, 6, 747–66.

KENNEY, M. and FLORIDA, R. (1992). *Beyond Mass Production: The Japanese System and its Transfer to the United States*. Oxford: Oxford University Press.

KENNEY, M. and FLORIDA, R. (1994). 'Japanese maquiladors: production organization and global commodity chains'. *World Development*, **4**, 1, 27–44.

KENNEY, M., GOE, W. and CONTRERAS, O. (1998). 'Learning factories or reproduction factories? Labour–management relations in the Japanese consumer electronics maquiladoras in Mexico'. *Work and Occupations*, **25**, 3, 269–304.

LINCOLN, J. R. and KALLEBERG, A. (1990). *Culture, Control and Commitment: A Study of Work Organization and Work Attitudes in the US and Japan*. Cambridge: Cambridge University Press.

Malaysian Industrial Development Authority (1996). *Industry Brief: The Electrical and Electronics Industries in Malaysia: Status, Prospects and Opportunities*. Kuala Lumpur: MIDA.

MILKMAN, R. (1991). *Japan's California Factories: Labour Relations and Economic Gobalization*. ILLR Monograph and Research Series. Los Angeles: UCLA.

Ministry of International Trade and Industry (Malaysia) (1996). *The Second Industrial Master Plan 1996–2005*. Kuala Lumpur: MITI.

MORRIS, J. (Ed.) (1991). *Japan and the Global Economy: Issues and Trends in the 1990s*. London: Routledge.

MORRIS, J. and WILKINSON, B. (Eds) (1995). 'The transfer of Japanese management to alien institutional environments'. *Journal of Management Studies*, **32**, Special Issue, 6.

MORRIS-SUZUKI, T. (1992). 'Re-shaping the international division of labour: Japanese manufacturing investment in South East Asia'. In Morris, J. (Ed.), *Japan and the Global Economy: Issues and Trends in the 1990s*. London: Routledge, 135–53.

OLIVER, N. and WILKINSON, B. (1992). *The Japanization of British Industry*. Oxford: Blackwell.

RASIAH, R. (1994). 'Flexible production systems and local machine-tool subcontracting: electronics components transnationals in Malaysia'. *Cambridge Journal of Economics*, **18**, 279–98.

SEWELL, G. and WILKINSON, B. (1992). '"Someone to watch over me": surveillance, discipline and the just-in-time labour process'. *Sociology*, **26**, 2, 271–89.

SMITH, W. (1994). 'Japanese enterprises and industrial relations in Malaysia: Japan's contribution to the impact of globalization on Malaysian industrial workers'. Paper presented to the Conference on 'International Trade Unionism at the Current Stage of Globalization and Regionalization of the Economy', Saitama University, Japan, 6–9 April.

TAKAYASU, K. and ISHIZAKI, Y. (1995). 'The changing international division of labor of Japanese electronics industry in Asia and its impact on the Japanese economy'. *Pacific Business and Industries*, **27**, 2–41.

TAKAYASU, K., YOYAMA, A. and MORI, M. (1998). 'ASEAN's industrial structures: currency turmoil spawned by import-inducting structures'. *Pacific Business and Industries*, **39**, 8–36.

TAKEUCHI, J. (1993). 'Foreign direct investment in ASEAN by small- and medium-sized Japanese companies and its effects on local supporting industries'. *Pacific Business and Industries*, **4**, 36–57.

TAKEUCHI, J. (1999). 'Employment and human resource development in Japanese-affiliated manufacturers in South East Asia'. *Pacific Business and Industries*, **41**, 2–19.

WILKINSON, B. (1994). *Labour and Industry in the Asia-Pacific: Lessons from the Newly-Industrialised Countries*. Berlin: de Gruyter.