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5 Japanese foreign direct investment in the United States

The case of the automotive transplants[1]

Richard Florida and Martin Kenney

INTRODUCTION

Since the early 1980s, most major Japanese car makers have opened transplant manufacturing facilities in the United States. Currently there are eight major transplant assembly facilities in the United States and three more in Canada. According to our most recent estimates, there are 270 transplant automotive parts suppliers in the United States. By the early 1990s, the transplants will be turning out roughly 2.5 million vehicles – one-fifth of all cars produced in the United States. The total amount of transplant investment (including assemblers and suppliers) currently exceeds $10 billion dollars.

This chapter summarizes findings from a two-year study of the automotive transplants, which was designed to shed new light on the organization of work and production, the main factors influencing their location, and the rise of 'just-in-time' automobile production complexes in the United States. The first section discusses the research design of the study. The second section provides an overview of transplant automobile investment in the United States. The third section discusses the transfer of Japanese production and work organization at both transplant assemblers and suppliers. The fourth section explores unionization and industrial relations in the transplants. The fifth section examines the rise of integrated 'just-in-time' supplier complexes in the US. The conclusion synthesizes our empirical findings to shed insight on the basic elements of the 'Japanese model' of industrial organization and its relevance to current debates over industrial restructuring.

RESEARCH DESIGN

The research upon which this chapter is based was undertaken in three parts. The first part involved the compilation of a comprehensive database on transplant assemblers and suppliers in the US. The database includes information on the name, location, corporate parent, investment, employment, and related variables for the 11 North American assembly plants and 270 transplant parts suppliers (both wholly-owned Japanese and Japanese–US joint venture suppliers). This database was used, among other things, to compile maps of the location of transplant assemblers and their suppliers. The database is linked to a related database on Japanese steel and rubber investments in the US, and is continuously updated to include current plant sitings and investments.

The second part of the research involved a detailed case study of the Honda assembly facility which includes a motorcycle assembly plant, two main automobile assembly plants, an engine and transmission casting facility, and a major R&D centre, and its surrounding supplier complex. The Honda case study was based upon detailed field research including plant visits and in-person interviews with Honda officials at transplant facilities and in Japanese facilities, and related plant visits and in-person interviews with Honda suppliers in the US and Japan. US site visits and interviews were conducted by members of the research team; Japanese interviews were conducted by Martin Kenney during a six month visiting professorship in Japan.

The third part involved a mail survey of transplant suppliers. At the time the survey was conducted, we identified a total of 229 transplant parts suppliers in the US. The survey was originally sent to 196 of the total 229 transplant suppliers for which full addresses could be obtained and yielded 73 completed surveys – a response rate of 37.2 per cent. The survey asked questions about the transfer of Japanese production organization, wages, unionization, major factors influencing the decisions to relocate in the US, major factors influencing the choice of location in the US, and the presence of 'just-in-time' industrial linkages between suppliers and transplant assemblers.

JAPANESE AUTOMOTIVE TRANSPLANTS IN THE UNITED STATES

Japan's major car companies have invested heavily in the United States over the past five years. Honda, Isuzu, Mazda, Mitsubishi,

Nissan, Subaru, and Toyota have all built major North American facilities. They have done so both to gain access to the huge US market and to circumvent growing American protectionism (for example, the 1981 Voluntary Restraint Agreement which limits exports of Japanese cars to the United States). The US market also affords a major growth opportunity. Some of Japan's smaller automakers, like Honda, see transplant investment as an opportunity to expand outside the brutally competitive Japanese car market (Sakiya 1987).

There are now eight major automobile assembly plants in the United States and three more in Canada. This represents an investment of roughly $6.5 billion dollars. By the mid-1990s, the North American transplants are expected to produce more than 2.5 million motor vehicles and employ more than 30,000 workers.

Figure 5.1 shows the locations of North American transplant assemblers. Transplant assemblers are located in a well-defined 'transplant corridor' which drifts slightly south of the more traditional North American auto belt, stretching from southwest Ontario and southeast Michigan on the north, in an almost straight line south through Ohio, Kentucky, and Tennessee, and west to Indiana and Illinois (Mair, Florida, and Kenney 1988). Interestingly, with the exception of Ohio, no state has more than one transplant assembler. The locational pattern of transplant assemblers in the lower Midwest stands in sharp contrast to the attempts by US car makers to minimize labour costs by relocating production to low wage areas of the Sunbelt or Third World (Frobel *et al.* 1980; Bluestone and Harrison 1982).

Transplant investment in the automobile industry has come in three waves (see Table 5.1). Honda, Nissan, and NUMMI were the first to set up American plants. Honda opened a motorcycle plant in rural Ohio in 1979 and opened its Marysville, Ohio automobile assembly plant in 1982 (Sakiya 1987). Nissan began truck production in Smyrna, Tennessee in 1983 and followed with cars in 1985 (Runyon 1987). NUMMI opened its doors in 1984 (Krafcik 1986).

These successes prompted a 'second wave' of transplant investments as other Japanese manufacturers decided to open US factories. In 1987, Mazda opened a US factory on the site of an old Ford engine foundry in Flat Rock, Michigan (Hill *et al.* 1988; Nobuto 1987). Toyota opened a second US plant in Georgetown, Kentucky in 1988. That same year, Mitsubishi and Chrysler launched a joint venture – Diamond Star Motors – in Normal, Illinois (Nakane 1987). Subaru-Isuzu opened a joint venture plant in Lafayette, Indiana in 1989

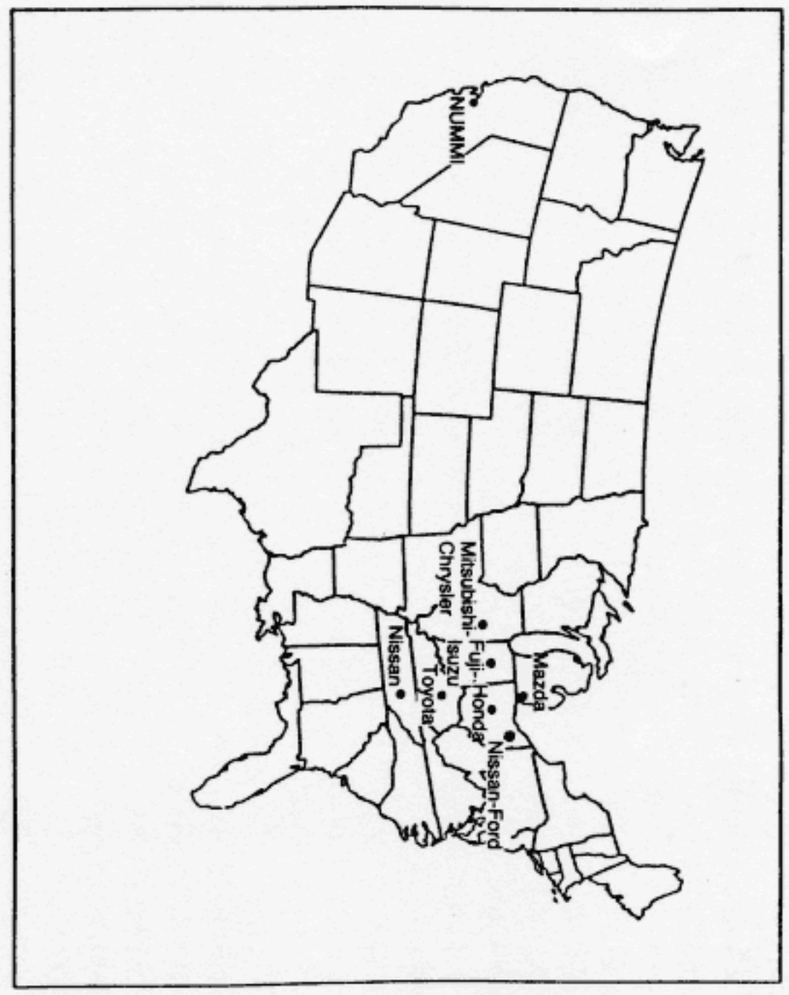

Figure 5.1 Japanese automobile assembly transplants in the USA
Source: Compiled by the authors.

(Yamamoto 1988). Nissan and Ford recently announced a joint venture to begin production in 1991 in Avon Lake, Ohio.

The 'third wave' of Japanese investments are expansions of existing transplant facilities. Honda added an engine and transmission plant in 1986, a second assembly plant in 1988, and plans to open a major R&D facility shortly (personal interviews). In 1988, Honda purchased a $31 million automotive test centre from the State of Ohio where it will house a new, 500 person R&D facility. This is in keeping with the Japanese practice of locating R&D close to production facilities to improve interaction and communication. Honda is considering a third automobile assembly plant to produce either a down-market subcompact or luxury Acuras. Nissan has added an engine and transmission facility in Smyrna, Tennessee. Toyota is also building an engine and transmission facility in Georgetown, Kentucky, and has announced a joint venture to produce forklifts with Toyoda Automatic Loom near Columbus, Ohio (*Ward's Auto World*, July 1989: 121).

Large numbers of Japanese transplant automobile parts suppliers

Table 5.1 Japanese automobile assembly plants in North America

Japanese company	*Location*	*Start date*	*Projected capacity*	*Employment at full capacity*	*Investment ($ millions)*
United States					
Honda	Marysville, Ohio	1982	510,000	8,000	870
Nissan	Smyrna, Tennessee	1983	440,000	5,100	880
NUMMI	Fremont, California	1984	300,000	3,400*	500
Mazda	Flat Rock, Michigan	1987	240,000	3,400*	550
Toyota	Georgetown, Kentucky	1988	200,000	3,500	800
Diamond Star	Normal, Illinois	1988	240,000	2,900*	700
Subaru–Isuzu	Lafayette, Indiana	1989	120,000	1,700	600
Nissan-Ford	Avon Lake, Ohio	1991	130,000	1,300	700
US Sub-total			2,180,000	29,300	5,600
Canada					
Honda	Alliston, Ontario	1986	80,000	850	225
Toyota	Cambridge, Ontario	1988	50,000	1,000	320
CAMI (Suzuki–GM)	Ingersall, Ontario	1989	200,000	2,000*	500
Canadian Sub-total			330,000	3,850	1,045
Total			2,510,000	33,150	6,645

Sources: Compiled by authors from the most current data available (the Japanese Automobile Manufacturers Association, Japan Economic Institute, US International Trade Commission, *Business Week*).
Note: *Employs workers organized by the UAW

have followed transplant assembly facilities to the United States. According to our most recent data, there are now 270 transplant automotive parts suppliers (both wholly Japanese owned and Japan–US joint venture suppliers) in the United States. This represents a total investment of more than $4 billion dollars.

Three types of transplant automotive suppliers have come to the United States. The first group (which comprise the large majority) are original equipment manufacturers who supply inputs directly into the production process, such as glass, brake systems, seats etc. The second group are 'after-market' or replacement part suppliers who make replacement parts (for example, batteries, brake pads, mufflers etc.) for Japanese imports. For example, one of Japan's leading battery companies, Japan Storage Battery, has recently launched a joint venture with a US firm. The final group are 'capital goods' manufacturers which provide manufacturing equipment to transplant assemblers. There are now 16 Japanese machine tool companies in the United States, 2 major conveyor belt companies with 5 US plants, and 2 manufacturers of automotive paint sytems. There has also been a related wave of transplant steel and rubber investments in the United States, which we do not count as parts suppliers. Over the past five years, 56 Japanese steel companies and 17 Japanese-owned rubber plants have opened in the United States, many of which are located in the Midwestern 'transplant corridor' (Kenney and Florida 1989).

Additional waves of transplant assembly and supplier investment can be expected in the future. Subaru–Isuzu, for example, expects to double the output of its Indiana plant, while Toyota expects to double output at both NUMMI and Kentucky. Japanese truck manufacturers such as Hino, Nissan Diesel, and Fuso may also open US factories in the future.

Interestingly, a number of transplant producers expect to export from the US. Nissan already 'reverse-exports' a few Tennessee-made pickup trucks to Japan (*Ward's Auto World*, January 1988; personal interview, Nissan Trading Company official, January 1989). Honda reverse-exports American-made cars to Japan, shipping 5,000 automobiles in 1988 and 50,000 more in 1989. Honda plans to begin shipping US-made Hondas to Korea – a country which excludes Japanese imports but allows US cars (*Ward's Auto World* January 1988). Toyota has recently announced plans to ship 5,000 automobiles to Taiwan (*Wall Street Journal*, 22 December 1985). It is likely that Japanese companies will attempt to export US-made automobiles to Europe, placing the US government in the awkward position of either protecting the right of US-made automobiles to be exported to Europe or allowing Europe to exclude US-made automobiles.

WORK AND PRODUCTION ORGANIZATION

A major aspect of the research was devoted to understanding the transfer of Japanese production organization to the United States. The major characteristics of the Japanese system are now well known: small numbers of job classifications, work teams, worker rotation and decentralized decision making (Aoki 1984; Koike 1984, 1987; Shimada 1983). This differs markedly from the high numbers of job classifications and strict functional specialization characteristic of US automobile production (Aglietta 1979; Altshuler *et al.* 1984; Katz 1985). The Japanese system is characterized by high levels of 'learning-by-doing' (Koike 1987; Shimada and MacDuffie 1987; Aoki 1986, 1987), a high degree of 'functional integration' on the shop-floor and across the R&D-manufacturing spectrum (Imai, Nonaka, and Takeuchi 1984), and is able to tap the intellectual as well as physical capabilities of workers (Kenney and Florida 1988).

Table 5.2 provides some basic information on production organization and industrial relations for transplant assemblers and a comparison or 'control' group of Big Three auto-makers. This table includes information on wages, unionization, job classifications, work teams, worker rotation, and related variables.

Table 5.2 Work organization and industrial relations in transplant assemblers

	No. of job class.	*Work teams*	*Rotation*	*Worker quality control*	*Starting wages ($)*	*Union*
Honda	3	+	+	+	11.00	–
Nissan	4	+	+	+	11.10	–
NUMMI	4	+	+	+	11.95	+
Toyota	3	+	+	+	10.49	–
Mazda	2	+	+	+	10.98	+
Diamond Star	3	+	+	+	11.74	+
Big Three	90	–	–	–	10.90	+

Sources: US General Accounting Office, 1988; *Wall Street Journal* (16 August 1989); personal interviews by authors.

Wages at the transplant assemblers are comparable to wages at Big Three assembly plants, around $11.00 per hour to start and $12.50

per hour after a year on the job. Transplant suppliers also pay relatively high wages, on average, $7.21 per hour to start and $8.01 after a year on the job for 'low skill' workers, and more than $11.00 for 'high skill' workers. Total annual compensation for transplant suppliers averages $21,268 per year. This is slightly below the wage levels at US parts suppliers (US International Trade Commission 1987).

The transplants have successfully transferred Japanese production organization to the United States. There are 4 job classifications for production workers at Nissan and NUMMI, 3 each at Honda, Toyota and Diamond Star, and just 2 at Mazda. This compares to an average of over 90 job classifications at Big Three car makers.

Work teams are the norm in transplant assemblers. Teams of between 5 and 15 workers are used in each of the transplants. At Honda, for example, teams are headed by 'team leaders' who are also workers. 'Production co-ordinators', recruited from the shop-floor, oversee the work performed by various teams. Above this is a narrow band of plant managers and vice-presidents (personal interviews).

The transplant assemblers have implemented worker rotation, worker quality control circles, systems for worker input, and decentralized decision making, although these are not practised as intensively as they are in Japan. Honda workers, for example, rotate mostly within their own team or to adjacent teams. Workers are encouraged to apply for rotation, although in some instances management will suggest that a worker rotate to a new job. Honda managers indicate that US workers are likely to stay in jobs longer than Japanese workers in order to build up basic job-related skills (personal interviews). According to Honda executives, it will take a 'few years' for a full rotation system to be established in the US (personal interviews).

Honda's US assembly lines are similar though by no means identical to those used in Japan. They allow sub-assembly work to be done in areas adjacent to the main line and can be quickly reconfigured to assemble either Civics or Accords. Inventory control also differs from US standards. Honda's Marysville assembly plant works on a tightly scheduled 'just-in-time' system similar to that in Japan. Production co-ordinators are in constant communication with teams and update inventory requirements through radio headsets. In some cases, experimental automated vehicles have been used to supplement this process, in other cases sideline inventories have been replaced altogether by overhead conveyors which move related parts above the assembly line. Our comparison between Honda's US and

Japanese practices indicates a high degree of similarity in the organization of production. As a consequence, productivity at Honda's Marysville plant is comparable to Honda's Japanese plants (site visits to Honda's US and Japanese plants).

Honda also uses rigorous recruitment and training techniques to select, acclimatize and to socialize workers to Japanese production organization. In contrast to the typical US practice of hiring 'off the street', Honda puts potential workers through a battery of tests and other screening procedures to identify employees who work well in teams, who are dedicated to their jobs, and who will not be absent (personal interviews). Previous job records or high school records are scrutinized for absenteeism. After an initial screening, potential employees go through extensive interviews with personnel officials, managers, and at times members of his or her potential team. Training begins with a six- to eight-week introductory period, after which workers are inserted into teams where they continue to learn from, and be socialized by, senior employees. Team leaders and managers will often be sent to Japan for additional training and 'indoctrination'. At Honda, a variety of additional skill-upgrading and training courses including an associate's degree programme are offered at the plant site (personal interviews). Simply put, at Honda, and at other transplants, the acclimatization of US workers to Japanese production organization is not left to 'chance', workers are moulded to the Japanese system through a highly selective process of recruitment and socialization.

A main focus of our research explored the use of Japanese production organization at transplant suppliers. Our survey provides conclusive evidence that transplant suppliers, as well as assemblers, have successfully implemented Japanese work organization. More than 85 per cent of respondents indicate that they use between one and five job classifications for production workers. In actual numbers, 23 suppliers use one job classification per production worker, 10 use two, 11 use three, 10 use four, and 4 use five. Only 9 suppliers had more than five job classifications for production workers. Most transplant suppliers make use of work teams and rotation. Some 87 per cent said that they rotate workers within teams, while roughly 66 per cent said workers rotate among teams.

Moreover, workers have significant discretion in the performance of shop-floor tasks. Some 68 per cent of respondents indicate that shop-floor workers are responsible for quality control and roughly 80 per cent indicate that production workers perform maintenance on

Table 5.3 Work organization and industrial relations in transplant suppliers

	Number	*%*	*Total N*
Organization of work:			
No. of job classification			
– one	23	34.3	67
– two	10	14.9	67
– three	11	16.4	67
– four	10	14.9	67
– five	4	6	67
Subtotal	58	86.6	67
Work teams	56	76.7	73
Work rotation			
– within teams	60	87.0	69
– between teams	45	77/2	68
Worker quality control	49	68.1	49
Worker maintenance	58	79.5	73
Worker input in job design	42	61.0	69
Compensation:			
Avg. starting hourly wage	$7.21	–	66
Avg. hourly wage after 12 months	$8.01	–	60
Avg. annual compensation	$21,268	–	65
Workforce characteristics:			
Minority		11.0	68
Female		34.0	69

Source: Transplant Supplier Survey, by authors (June 1988).

their own machines. Another 61 per cent indicate that production employees share responsibility for designing their own jobs.

Transplant suppliers believe that the system of work organization they are implementing in the United States is quite similar to the one they use in Japan. When asked how comparable they thought their plants here are to ones in Japan, more than 75 per cent indicated that they are the same or very similar.

In sum, production organization at both transplant assemblers and suppliers is comparable to Japanese practices in Japan. The transplants have effectively implemented a system of production and work organization that decentralizes decision making and encourages shop-floor initiative and learning. The cumulative findings from our survey research, personal interviews, and case studies leave us at odds with commentators like Parker and Slaughter (1988) who contend that the success of the Japanese transplants is due to the relentless exploitation of workers or what they call 'management-by-stress' (also see Dohse *et al.* 1985). The transplants are successful because they organize work to mobilize the full capabilities of their

workers. Simply put, a unique synthesis of 'smart work' and 'hard work' is the key to the transplants' success. As one worker in a transplant automobile facility put it:

> Management and factory work very well together here. Most companies run the management and the factory like two separate companies, the former being more of the brain part and the latter the muscle. This company has a very good coordination between the two.

The effective implementation of Japanese production organization enables the transplants to achieve productivity ratings which rival their Japanese sister plants. According to Krafcik (1989), the productivity levels of a number of transplants compares favourably to the productivity of Japanese automobile plants and is significantly better than that of the Big Three auto-makers.

UNIONIZATION AND INDUSTRIAL RELATIONS

The conventional wisdom that transplant auto-makers avoid US unions is only partly true. On the one hand, transplant assemblers are basically split between those who recognize the union and those who are non-unionized. Four assemblers, Honda, Nissan, Toyota (Georgetown) and Subaru-Isuzu, are non-unionized and have sought to avoid unionization. Four other assemblers, NUMMI, Mazda, Diamond Star, and Nissan-Ford are unionized. On the other hand, transplant suppliers have largely chosen to implement Japanese production organization without US unions. Just 4 of the 73 suppliers who responded to the supplier survey are unionized.

In each case that a Japanese transplant has dealt with the UAW, it has had a Big Three car maker as a partner. NUMMI, Diamond Star, and Nissan-Ford are joint ventures between Japanese car makers and Big Three producers: and, although Mazda is not explicitly a joint venture, it has close ties to Ford. In fact, Hill *et al.* (1988) indicate that Ford helped sway Mazda's decision to open a US facility by having Mazda produce its new 'Probe', selling land and buildings to Mazda at bargain prices, and providing important advice on how to deal with the union. Ford holds a one-quarter equity position in Mazda as well.

In the cases of two of the unionized transplants, NUMMI and Mazda, long negotiations between management and the UAW were undertaken to restructure traditional US labour–management relations in the light of Japanese production organization. Under an

agreement between General Motors (GM), Toyota, and the UAW, the number of job classifications was reduced from nearly 200 to just 4, 1 for production workers and 3 for skilled trades (Krafcik 1986). NUMMI is especially interesting since it occupies an old GM plant which according to a top GM executive 'was one of the worst plants in the industry'. Past GM employees were given hiring preference and approximately 85 per cent of the initial work-force was comprised of ex-GM workers. Although tenure is not formally guaranteed, NUMMI workers receive stronger job security as a result of the agreement than UAW workers employed by US auto-makers. The UAW is consulted on layoffs, major investment decisions, changes in production scheduling, and other traditionally management prerogatives.

Mazda's Flat Rock plant experienced a similar process of negotiation and restructuring of labour-management relations (Nobuto 1987). Basically, the union agreed to new work rules in return for preferential hiring of displaced Ford employees and a wage rate that was pegged at 85 per cent of Ford's (Hill *et al.* 1988). Mazda workers are organized in teams and there are just two basic classes of manufacturing employees – production and maintenance workers – though there are a series of job titles for skilled trades workers. Displaced Ford workers were given special preference to enter the hiring pool, although they did not receive special preference in actual hiring decisions.

The reasons why this type of industrial relations restructuring was necessary can be understood in terms of the rigidities of the existing 'Fordist' pattern of US labour–management relations or what Katz (1985) refers to as 'job control unionism', in which both wages and tenure security are tied to specific job classifications. This is not to say that production organization simply calls forth a particular type of labour-management relation, but that the two must exist in a rough symmetry or correspondence. If not, existing forms can become an impediment to change. Kochan, Katz and McKersie (1986: 86) observe that:

> [W]ork practices and rules can accumulate and become outmoded because of changes in technology, product or job design or plant layout. Yet they are often hard to change; change can alter workers' status, employment security and promotion opportunities either by affecting the scope of job responsibilities or by altering such things as worker security and transfer rights.

At NUMMI and to a lesser extent at Mazda, a concerted effort was needed to 'unfreeze' traditional US labour–management practices in order to create an environment amenable to Japanese production organization.

Even though both NUMMI and Mazda are unionized (and perhaps because of this), workers at both plants have put forward a range of complaints and grievances. Workers at NUMMI, for example, have complained that the new plant runs at a much higher pace than the old GM-Fremont plant, that work is more continuous, and that speed-up occurs frequently. NUMMI workers have also asserted that low rates of absenteeism reflect fear of suspension rather than contentment with their jobs. And, NUMMI's turnover rate has been significantly above the average for the GM system. On the other hand, many of these same workers have also indicated that their jobs are both more rewarding and more secure under NUMMI management than they were under GM management.

The four remaining transplants have aggressively avoided the UAW. Basically, these transplants have placed their factories in rural 'greenfield' locations outside existing union strongholds as a strategy to avoid unionization (Mair, Florida, and Kenney 1988). Honda, for example, is located in the small central Ohio town of Marysville, a rural community with a population of less than 7,500. Nissan is located in Smyrna, Tennessee, a town of some 8,300 people. Toyota's plant is in Georgetown, Kentucky, a community of 10,900. Transplant suppliers also prefer to locate in suburban or rural areas outside union strongholds. More than one-third of all transplant suppliers are located in rural 'non-metropolitan' areas. Another 28 per cent are located in small suburban communities with populations of less than 25,000. Just 15 per cent of transplant suppliers are located in cities which have populations of more than 100,000.

Rural greenfield locations enable Japanese transplants to gain the benefits of an existing transportation and industrial infrastructure, while avoiding areas with high levels of unionized labour or long histories of industrial conflict. Honda executives indicate that their site selection reflects a preference for rural workers who have a 'good work ethic' over urban workers who have 'picked up' bad habits (personal interviews).

The selection of greenfield sites also tends to have a discriminatory effect toward blacks and other minorities. Cole and Deskins (1988) conclude that:

> Japanese firms can stay within Equal Employment Opportunity Commission guidelines and still hire very few blacks. By placing

their plants in areas with very low black populations, they in effect exclude blacks from potential employment.

Honda settled an Equal Employment Opportunity Commission (EEOC) suit charging discrimination on the basis of its requirement that employees live within a 30-mile radius of the plant, thus effectively excluding minorities from jobs. As a result of this settlement, Honda agreed to hire and provide back pay to 370 black and female workers, increase its minority recruitment efforts, and expand its hiring radius to include Columbus, Ohio (Embrey 1988).

In addition to site selection, both Honda and Nissan have raised wages and benefits in part to fend off unionization. Honda, for example, introduced a new bonus scheme, established a grievance system and employee credit union, and distributed stock to veteran employees as part of a successful effort to defeat a major UAW organizing drive in 1985. Much more serious struggles occurred at Nissan where there have been widespread reports of employee discontent (*Business Week* 1989b). A recent vote over unionization which was held after a bitter certification campaign resulted in a staggering defeat of the union by a 70–30 margin. This was a major setback for the UAW which had made Nissan a test case (Patterson 1989).

'JUST-IN-TIME' SUPPLIER COMPLEXES

Another main aspect of the research explored the transferability of Japanese 'just-in-time' supplier organization to the United States. Both the conventional wisdom and the academic literature at the time we began this study suggested that the Japanese transplant assemblers were simple 'branch plant' operations with low US content that put together cars that were 'knocked-down' and imported from Japan.

Figure 5.2 is a map showing the location of both Japanese assemblers and suppliers in the United States. As this map clearly shows, each of the transplant assembly plants is surrounded by a dense network of transplant suppliers. Indeed, the great bulk of transplant suppliers are located in states that also have transplant assemblers. According to our most recent estimates, there are 55 transplant parts companies in Ohio, 42 in Michigan, 39 in Kentucky, 31 in Indiana, and 24 each in Illinois and Tennessee. These six states account for roughly 80 per cent of all transplant parts suppliers in the United States.

The basic characteristics of the Japanese system are widely known.

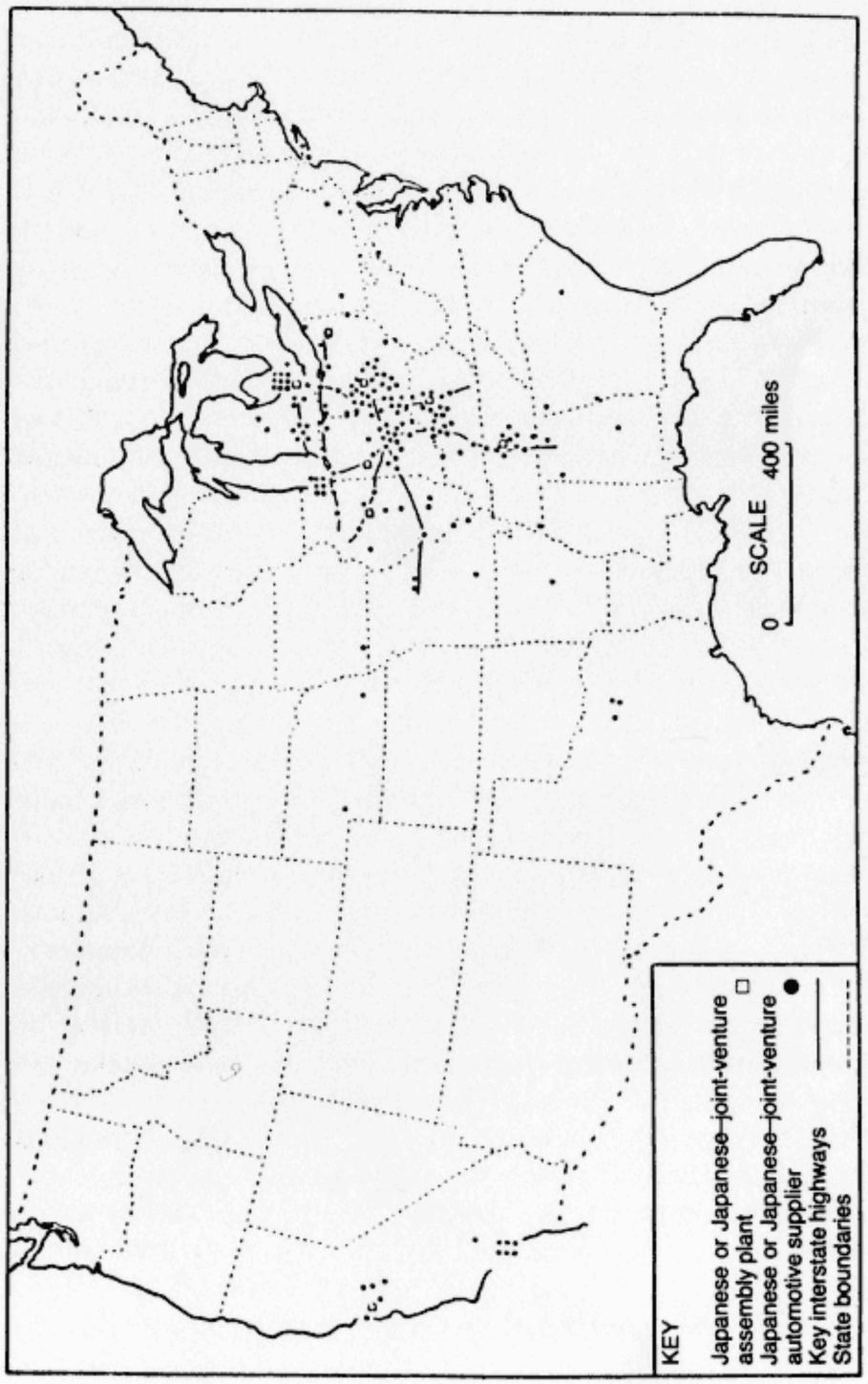

Figure 5.2 Japanese transplant parts assemblers and suppliers in the USA
Source: Updated from Mair, Florida, and Kenney (1988).
Note: Includes both wholly Japanese owned and Japanese–US joint venture parts suppliers.

according to just-in-time schedules. Honda executives corroborated this, indicating that virtually all their components are delivered according to just-in-time delivery schedules. Honda's seat sub-assemblies, for example, are ordered by computer from an adjacent Japanese supplier just as cars start down the line (personal interview 1987). However, executives we interviewed at Honda and its suppliers said that the distances separating the two are typically longer in the United States than in Japan (personal interviews). NUMMI, which is supplied by a larger number of US-owned parts suppliers than the other transplants, organized a supplier council of seventy mostly US-owned suppliers to facilitate information sharing and product improvement (Krafcik 1986).

The growing literature on industrial linkages suggests that they are most effective when they include information transfer and interaction between suppliers and end-users (Dore 1983; Holmes 1986). The supplier survey allowed us to look systematically at the levels of interaction, personnel sharing, joint R&D, and other indicators of linkages between suppliers and assemblers. According to the survey, 97 per cent of transplant suppliers are contacted immediately by phone when they deliver a defective product. Eighty-two per cent indicated that engineers from their major customer came on site when they were setting up US operations, and 86 per cent said that engineers from their major customer make site visits now to help overcome quality control or production problems.

Participation in the development of new products also occurs frequently. More than 65 per cent of suppliers in the survey participate closely with assemblers in the development of new products. Honda engineers, for example, developed new production techniques for a small Ohio plastics firm that became a Honda supplier. Honda intends to use its Marysville R&D centre to integrate both transplant and US suppliers into the design of future cars (personal interviews).

Because of these tight linkages, transplant assemblers are reticent to hire employees away from their suppliers. Personnel officials at Honda for example told us that they do not consider applications from employees of Honda's main suppliers (personal interviews). This is in keeping with the Japanese practice of discouraging and inhibiting employee-initiated mobility.

But the supplier survey indicates that this pattern of tight interactive linkages does not extend further down the supply chain. For example, just 43 per cent of the (first-tier) suppliers in the survey receive just-in-time deliveries from their (second-tier) suppliers. We used survey information to estimate average travel times between

first- and second-tier suppliers. Generally speaking, the distances separating first- and second-tier suppliers are considerably longer than those between assemblers and their first-tier suppliers. Just slightly more than 40 per cent of second-tier suppliers are within a six-hour driving radius of their major customer; an additional 18 per cent are located within a 6 to 10 hour radius, but more than 40 per cent are located more than ten hours away from their main customer. In addition, the responses to the supplier survey indicate that second-tier suppliers have little interaction in design or development of new products. Less than 30 per cent of first-tier suppliers integrate second-tier suppliers in new product development. This contrasts sharply with Japan where tight linkages extend to second- and third-tier suppliers.

Based on these findings, we are led to conclude that transplant complexes in the US are 'stretched out' versions of Japan's dense just-in-time complexes. While the transplant assemblers are successfully assembling a first-tier supplier ring, (our comparative research indicates that most of the first-tier of Japanese suppliers to Honda, Nissan, Toyota, and Mazda have now opened US branches), they lack the dense layers of second- and third-tier suppliers that characterize the Japanese automobile industry. However, a number of first-tier suppliers are forging links to US producers, extending the supplier complex backward to include local companies. For example, one very small machine shop in rural Ohio has capitalized upon previous expertise in rebuilding tractor engines and farm machinery and now rebuilds robot heads for Honda and Honda suppliers (personal interview). In effect, Honda is using the indigenous manufacturing infrastructure of central Ohio and surrounding areas to build a multi-tier just-in-time complex. Interestingly, with plenty of space to accommodate growth, the relatively uncrowded landscape of the US may ultimately prove to be better suited to the development of just-in-time complexes than the densely crowded industrial landscape of Japan. Only time will tell whether or not the transplants are able to build full-blown just-in-time complexes like those of Japan.

CONCLUSIONS

Over the past five years or so, Japanese automobile manufacturers and their suppliers have moved into the United States at a remarkable pace, creating an entire 'second system' of automobile production in the lower Midwest. The findings of our research clearly

indicate that the Japanese model of automobile production is transferable to the US, contradicting the notion that Japanese production organization is somehow dependent upon Japanese culture or other uniquely Japanese characteristics. The Japanese model of production is at bottom a set of organizational techniques and relationships which can and are being effectively exported to the US.

Our findings enable us to distil a number of key organizational features of the Japanese model. These include:

1 new modes of production and work organization which tap the intelligence of shop-floor workers leading to a unique synthesis of smart and hard work;
2 high levels of functional integration both inside and outside the plant;
3 a highly organized 'pyramidal' organization of suppliers anchored by large assemblers.

While the basic characteristics of the Japanese model differ markedly from the traditional US and Western European 'Fordist' model of automobile production, it is incorrect to conclude from this that the Japanese model is just another variant of 'flexible' production described by Piore and Sabel (1984). On the contrary, there is little justification in this case study to support the contention made by Sabel (1989) that the Japanese system is moving toward 'convergence' with the flexible specialization model of small networked firms. At bottom, the Japanese system of automobile production that has been transferred to the US remains a system of mass production of automobiles. While this system is able to produce a series of cars on one assembly line, it is certainly not the small-scale batch production similar to that found in high fashion apparel and foot-wear. More importantly, it must be recognized that the main agents in the export of the Japanese model to the US are large firms such as Honda, Toyota, Mazda, Nissan, and others, who have actively constructed just-in-time industrial galaxies in the US. These large firms continue to play the critical role of 'hubs' or 'anchors' in these complexes, bringing a source of discipline, a structure for interaction, and a central co-ordinating mechanism for flows within the network of producers (see Florida and Kenney 1990).

Our findings lead us to conclude that the Japanese model represents a distinct path, one that is perhaps better suited to the demands of advanced industrial mass production than either the earlier model of Fordist mass production or the utopian formulation of 'flexible' specialization. More research on the Japanese model and its transferability is necessary to better understand the dynamics of global industrial restructuring.

NOTES

1 This research was funded in part by the US Department of Agriculture and the Ohio Board of Regents. We would like to thank the many managers and employees of Japanese transplants who consented to site visits, provided interviews, responded to telephone enquiries, and completed mail surveys. Special thanks are due to Marshall Feldman for his early input, Andrew Mair and James Curry for their collaboration on various phases of this project, and John Stamm of the Ohio Department of Development for his help arranging site visits. We gratefully acknowledge the research assistance provided by Barry Getzow and Suri Goplan. We thank Gordon Clark, Amy Glasmeier, Norman Glickman, Bennett Harrison, and Richard Walker for comments on earlier drafts. We, of course, take full responsibility for errors and omissions.

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6 Japanese manufacturing investment in Canada

Regional presence and integration strategies

Jonathan Morris

INTRODUCTION

The aim of this contribution is twofold. First, it will provide a description and analysis of the relatively recent growth of Japanese manufacturing activity in Canada. Second, its purpose is to illustrate the arguments outlined in other chapters of this book, notably the introductory chapter. That is, that regional world markets and production arenas are developing, that it is increasingly necessary for major world 'players' to be active within each regional market, and that this offers an explanation for a large part of Japanese manufacturing investment in Canada.

HISTORICAL TRENDS OF JAPANESE MANUFACTURING ACTIVITY IN CANADA

Japanese foreign direct investment (FDI) in Canada dates from 1965 but, until recently, has been almost completely overshadowed by activity in the USA. Blain and Norcliffe (1988) outline four main phases of this investment activity, the first of which was through trading companies and resource-based projects. The end of these years of initial activity coincided with the 'energy crisis' in 1973 with a switch to energy-based and forest-product ventures (Hata 1987; McMillan 1987).

In the 1980s growing protectionism has led Japanese companies to start local production plants in greater numbers. Record levels of Japanese investors, encouraged by the relative weakness of indigenous manufacturing and the slide of the Canadian dollar, were recorded in 1981 (Blain and Norcliffe 1988).

While accurate up-to-date figures and data on Japanese investments in Canada are difficult to come by, Langley (1987) estimates