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# TRANSPLANTED ORGANIZATIONS: THE TRANSFER OF JAPANESE INDUSTRIAL ORGANIZATION TO THE U.S.*

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*Industrial sociology and organization theory suggest that it is difficult to transfer organizations from one environment to another and that organizations that are transferred will take on characteristics of the new environment. We hypothesize that the organization/environment relation works in both directions and that organizations have the resources to alter their environments in light of their functional requirements. We explore these issues in light of recent debates over new models of production organization and interfirm production networks. Japanese automotive assembly plants and their suppliers in the United States provide an ideal case to explore such questions because they represent organizations that are being transferred from a supportive to a foreign environment. We find that these Japanese automotive transplants have effectively transferred both intra- and interorganizational characteristics, e.g., team-based work organization and "just-in-time" supplier relations to the United States. Thus, they have actively transformed their environments to suit their needs.*

Organization theory and industrial sociology suggest that organizations are closely tied to their environments. Both imply that it is difficult to transfer organizations from one environment to another and suggest that organizations that are transferred will gradually take on characteristics of the new environment. Japanese organizations are closely tied to their environment and thus may be particularly difficult to transfer.

We explore the cross-national transfer of organizational forms and practices and hypothesize that such forms and practices can be taken from their original environments and implanted into new ones. We contend that certain types of organizations (e.g., large, resource-rich, powerful organizations) have sufficient resources to alter the new environment in light of their functional requirements. Therefore, we suggest that the organization/environment relation is reciprocal. We address these issues in light of the recent debate over new forms of production and work organization, production subcontracting, and interfirm production networks (Piore and Sabel 1984; Sabel 1989; Perrow 1990; Kenney and Florida 1988; Florida and Kenney 1990a, 1990b; Lazonick 1990; Womack, Jones, and Roos 1990).

Japanese automobile manufacturing plants in the United States, which we refer to as the "transplants," provide an ideal test of these hypotheses because they have been transferred from a supportive to a nonsupportive environment. The U.S. environment is typically characterized in terms of "diversity," "individualism," and unrestrained market forces, while Japan is characterized in terms of "homogeneity," "familism," "paternalism," and/or "welfare corporatism" (Dore 1973). The ideal-typical large U.S. industrial organization is distinguished by high levels of functional specialization, large numbers of job classifications, extensive internal labor markets (Edwards 1979), adversarial labor-management relations (Kochan, Katz, and McKersie 1986; Katz 1985) and "arm's length" relations between corporations and their suppliers (Altshuler, Anderson, Jones, Roos, and Womack 1984; Womack et al.

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1990), whereas the ideal-typical large Japanese manufacturing firm is characterized by small numbers of job classifications (Aoki 1988), team-based work organization (Koike 1988), consensual relations between labor and management (Shirai 1983), and long-term supplier relations (Dore 1983, 1986, 1987).[1]

We examine the transfer of Japanese intraorganizational practices, such as work and production organization, and interorganizational characteristics, such as just-in-time supplier relations, to the United States in light of three related research questions: (1) Are organizations derivative of the environments in which they are embedded, or can they be removed from an original environment and successfully implanted in a new one? (2) What strategies do organizations devise to adapt, respond, and/or cope with a new environment? (3) Do they take on characteristics of the environment, or do they act on the new environment to bring it into line with their needs?

## THEORETICAL CONTEXT

Organization theory suggests that organizations that are transferred from one environment to another will take on characteristics of the new environment. A few researchers would argue for a tight, deterministic connection between environment and organizations; most suggest that organizations gradually take on characteristics of the new environment and/or of organizations with which they interact (DiMaggio and Powell 1983; Meyer and Rowan 1977; Zucker 1977; Granovetter 1985; Hannan and Freeman 1977; McKelvey and Aldrich 1983).

A few theorists focus explicitly on organizational influences on the environment. In his classic studies of innovation in capitalism, Schumpeter (1947) differentiated between "creative" responses that alter social and economic situations and the more typical "adaptive" responses of firms and economic organizations. Pfeffer and Salancik (1978) suggested that while organizations tend to adapt to their environments, they will sometimes alter the environment in line with their needs. Weick (1979) argued that the ability of an organization to influence, construct or "enact" its environment is a function of size. Young (1988) suggested that organizations can change their environments by strategic use of resources.

The literature on Japanese development is generally pessimistic regarding the transfer of Japanese organization. It suggests that Japanese organizations derive from cultural factors such as homogeneity, familism, and group loyalty (Nakane 1970; Benedict 1946). For Abegglen (1958), Japanese organizational characteristics like team-based work organization and long-term tenure reflect a general close alignment between persons and groups. Dore (1973) contrasted Japanese model of "welfare corporatism" with the Anglo-American model of "market individualism." Cole (1971) suggested that Japan's cultural legacy informs unique organizational solutions to general development problems. Recent research continues to be pessimistic about the transfer of Japanese organization (Cool and Legnick-Hall 1985).

Recent work (Shimada 1986; Shimada and MacDuffie 1986; Aoki 1988; Koike 1988) has concluded that Japanese work organization is a set of organizational forms that are relatively autonomous from culture and the environment. Several historical studies support this view. Taira (1961, 1964, 1970) documented the emergence of permanent employment from Japanese industrialists' need to cope with high rates of labor mobility and a desire to exert more effective control over the labor force. Gordon (1985) indicated that team-based work organization is the product of postwar industrial unrest over worker control of production (also see Kenney and Florida 1988). Empirical research (Lincoln and Kalleberg 1985, 1990) supports the view that Japanese organization rather than culture is the source of work-force motivation, control, and commitment.

Currently, there is a general debate over the rise of alternative forms of industrial organization, including new forms of work and production organization (Kenney and Florida 1988; Florida and Kenney 1990a; Lazonick 1990; Best 1990; Morris-Suzuki 1988; Zuboff 1988), new mechanisms for generating work-force control and commitment (Lincoln and Kalleberg 1990), new supplier relations (Dore 1983; Sako 1989), interfirm networks and production subcontracting (Piore and Sabel 1984; Lazerson 1988; Perrow 1990; Florida and Kenney 1990b), and ways of organizing the division of labor inside and outside the firm (Richardson 1972; Williamson 1975, 1981, 1983; Robins 1987; Perrow 1981, 1986). A growing body of work argues that the key to the current

[1] These are ideal-typical characterizations of large manufacturing firms, particularly automobile firms, in these countries, designed to focus attention on salient differences highlighted in the literature. In reality, there are significant differences among firms in each country and there may even be "mixed" forms.

transition lies in the emergence of new forms of organization at the point of production, such as work teams, task rotation, the application of workers' intelligence in production, and the integration of innovation and production (Florida and Kenney 1990a; Womack et al. 1990; Lazonick 1990; Best 1990). Taking a different perspective, Piore and Sabel (1984) contend that "flexibly specialized" communities of small firms are supplanting the older model of "fordist" industrial mass production (Aglietta 1979); others suggest that flexible specialization may be a transitory phenomenon (Powell 1987) or even a misreading of current trends (Gertler 1988).

A number of studies explore the role of Japanese organizational forms in this more general process. The flexible specialization school views the Japanese model as part of the global convergence toward small-firm networks (Piore and Sabel 1984; Sabel 1989; Friedman 1988). However, detailed empirical studies of Japanese interorganizational relations suggest that it is a distinctive system centered around large companies (Sayer 1986; Sako 1989; Florida and Kenney 1990b). Others see the Japanese system as an advanced and efficient form of fordist mass production (Dohse, Jurgens, and Malsch 1986; Parker and Slaughter 1988). Still others see Japanese production organization as a unique model. According to Womack et al. (1990), Japanese organizational practices constitute a new form of "lean production" toward which firms all over the world are converging. Kenney and Florida (1988; forthcoming) see the Japanese model as a successor to fordism that uses new organizational forms to harness the intellectual as well as the physical capabilities of workers. Our research explores the "generalizability" of these new organizational forms.

The empirical evidence regarding the transfer of Japanese organization is mixed. Yoshino (1976) suggested that the absence of Japanese sociocultural conditions in other countries is a serious obstacle to transfer. Cole (1979) was guardedly optimistic: "There are those who would argue that they [quality control circles] have their basis in Japanese cultural and institutional conditions, with their unique group orientation, practice of permanent employment, and strong employee commitment to organizational goals. Consequently they are held not to be applicable to the United States. My own judgement is they may well be applicable if appropriate adaptations are made to accommodate the circles to U.S. conditions" (Cole 1979, p. 255). White and Trevor (1983) concluded that Japanese organizational traits were not transferred to Japanese firms operating in the U.K. However, Oliver and Wilkinson (1989), Kumazawa and Yamada (1989), and Morris (1988) concluded that the Japanese management system has been successfully transferred to Japanese firms in the U.K. A study of Nissan in the U.K. (Crowther and Garrahan 1988) documented the emergence a Japanese-style automobile production complex comprising a main assembly plant and supplier firms.

Research on the transfer of Japanese organization to the U.S. is less extensive and the findings are inconclusive. Case studies of the GM-Toyota joint venture automobile assembly plant, NUMMI, in Fremont, California (Krafcik 1986; Brown and Reich 1989) provide evidence of successful transfer of Japanese organization. Mair, Florida, and Kenney (1988) documented the emergence of a complex of Japanese automotive assemblers and suppliers in the midwestern United States. A University of Tokyo study (Institute of Social Science 1990) concluded that automotive plants have been the most successful in transferring Japanese practices, while consumer electronics firms have tended to adapt or conform to the U.S. environment and semiconductor firms occupy a middle position. Fucini and Fucini (1990) reported interviews with Mazda workers as evidence of adaptation problems, including high rates of injury, worker discontent, and labor-management conflict. Most of these studies suffer from very small sample sizes, reliance on case-specific data, and a narrow conceptual focus on managerial practices. Our research remedies such problems by providing a theoretically-informed empirical study of the transfer of intra- and interorganizational forms and practices to Japanese automotive transplants in the United States.

## RESEARCH DESIGN

"Transplants" are defined as firms that are either wholly Japanese-owned or have a significant level of Japanese participation in cross-national joint ventures located in the U.S. We developed a database of Japanese transplant assemblers and suppliers from data provided by the Japan Economic Institute, U.S. government sources, industry trade journals, and newspaper reports. Eight assembly centers were identified in the United States, of which one operated two plants at one site and the rest operated single plants. In addition, 229 transplant suppliers were identified; this number has since grown to approximately 270.

The study population is heavily concentrated in a "transplant corridor" of the lower Midwest and upper South — an area with a legacy of traditional U.S. (fordist) organizational practices. Four of the assembly transplants, Mazda, NUMMI, Diamond-Star, and the Ford-Nissan joint venture are unionized; four others, Honda, Nissan, Toyota, and Subaru-Isuzu (SIA), are not. Three assembly transplants are joint ventures with U.S. producers: NUMMI, a GM-Toyota joint venture managed by Toyota, Diamond-Star, a joint venture between Chrysler and Mitsubishi, and Ford-Nissan.

Site visits were conducted at six of the seven operating transplant assembly plants in the U.S. (Honda, Nissan, Toyota, Mazda, NUMMI, and Subaru-Isuzu) and at various supplier firms including Nippondenso which has the largest investment in the U.S. of any transplant supplier.[2] More than 100 personal interviews were conducted. Interviews with Japanese and American executives focussed on investment strategies, location, production and organization, supplier relations, and interorganizational linkages. To reduce the potential for bias and increase reliability, the interviewees in assembly plants and suppliers were asked similar questions. Interviews with present and former shopfloor workers and engineers, trade union officials, and state and local government officials provided an additional check against respondent bias. A member of the research team visited Honda's main assembly facility in Japan as well as several automotive parts suppliers to provide a comparative context for the analysis.

A mail survey was administered to the universe of Japanese-owned or Japanese-U.S. joint venture suppliers in the United States. Establishments were the unit of analysis (rather than firms) to capture differences among plants owned by the same firm because establishments may make different components and use different management and organizational practices. Moreover, the research required responses from plant management familiar with the actual operations of the plant. The suppliers responding to the survey respondents were relatively evenly distributed by the assemblers they supply, thereby reducing the possibility for the idiosyncratic practices of one or two end-users to significantly affect the survey results.

The survey instrument obtained background information such as start-up date, employment, sales, industry, end-users, information on intraorganizational characteristics such as work organization, number of job classifications, use of teams, rotation, quality control circles, wages and wage determination, employment security and workforce characteristics, and information on interorganizational relationships such as delivery times, frequency of communication, shared personnel, and cooperation in R&D and product design. Addresses were located for 196 of the 229 suppliers in the original database. (Some of the firms for whom addresses were unavailable likely had not yet begun operations). Each establishment was then contacted by telephone to identify the appropriate person to complete the survey.

The survey was mailed in 1988. A series of follow-up post cards and letters resulted in 73 completed surveys for a response rate of 37.2 percent, which is comparable to the rates in other research of this type. Lincoln and Kalleberg (1985), for example, obtained a response rate of 35 percent from U.S. manufacturing firms and 40 percent from Japanese manufacturing firms. Further, Japanese-owned firms in the U.S. may have been reticent to respond because of the highly charged political climate surrounding their activities. We have no reason to believe there was any bias between respondents and nonrespondents.

## TRANSFER OF INTRAORGANIZATIONAL FORMS AND PRACTICES

### *Work and Production Organization*

Table 1 summarizes the main characteristics of work and production organization for transplant assemblers and for a representative Big Three automobile company. Table 2 presents similar information for transplant suppliers.[3]

*Work teams.* In Japan, work is organized on the basis of teams that are responsible for planning and carrying out production tasks (Aoki 1988; Koike 1988). Teams socialize production tasks and assign immediate managerial tasks to shopfloor workers. Table 1 indicates that work teams are used at all of the transplant assemblers. At Honda, Toyota, and NUMMI teams meet daily to discuss production improvements and rede-

[2] We were unable to arrange a visit to Diamond-Star and the Ford-Nissan venture was not yet operational.

[3] Here we note that not all Japanese automobile firms are organized the same way; each has its own "personality."

Table 1. Presence of Japanese Intraorganizational Practices In Transplant Assemblers: U.S., 1990

| Assembler | Work Organization | | Number of Job Classifications | Worker Quality Control | Average Annual Wages | Hourly Wages for Production Workers | Presence of Union |
|---|---|---|---|---|---|---|---|
| | Work Teams | Rotation | | | | | |
| Honda | + | + | 3 | o | $33,685 | $14.55 | No |
| Nissan | + | + | 4 | o | $32,579 | $13.95 | No |
| NUMMI | + | + | 4 | o | $36,013 | $16.81 | Yes |
| Toyota | + | + | 3 | o | $29,598 | $14.23 | No |
| Mazda | + | + | 2 | o | $32,970 | $15.13 | Yes |
| Subaru-Isuzu (SIA) | + | + | 3 | o | $28,995 | $13.94 | No |
| Big Three U.S. | – | – | 90 | – | $36,089 | $16.41 | Yes |

*Source*: Wage data for each transplant and average for Big Three producers are from Jackson (1990); data on intraorganizational practices of transplant assemblers are from site visits and personal interviews; data on intraorganizational practices of a representative Big Three automaker are from U.S. General Accounting Office (1988).

*Note*: + = similar to Japan; o = modified; – = different from Japan.

sign of tasks; meetings at the other transplants take place at least once a week. More than three-fourths of transplant suppliers organize production on the basis of work teams (Table 2).

*Task rotation.* Rotation of workers among tasks within a team is a key feature of Japanese production organization. Rotation functions to train workers in multiple tasks and to reduce the incidence of repetitive motion injuries. While rotation is used by all transplant assemblers, its frequency varies, as it does in Japan. Toyota, Honda, and NUMMI rotate workers in the same team quite frequently. Toyota workers in high stress jobs, e.g., jobs that require the use of a high impact "torque gun" or involve constant bending or lifting, rotate as frequently as once an hour, others rotate at break times, at lunch, or every other day. According to a NUMMI worker: "We would be rotating every time we had a break or change. If we had a break in the morning, we rotated. And then lunchtime, we rotated. And we had a break in the afternoon, we rotated. Every time the line stopped, a break or whatever, we rotated." Rotation is less frequent at Mazda, Nissan, and SIA. While these companies consider rotation a long-term goal, each has slowed or even stopped the use of rotation during production ramp-ups. Our interviews with Mazda workers confirm that infrequent rotation has been a major cause of repetitive motion injury at the Mazda plant. Rotation from team to team is less common both in Japan and in the transplants. In Japan, this type of rotation is typically mandated by management; in the U.S., it is more common for workers to apply for job transfers.

According to the supplier survey, roughly 87 percent of suppliers rotate workers within teams, while approximately 66 percent rotate among teams. Nippondenso rotates workers in high stress jobs every hour or two and encourages workers to apply for rotation from team to team. Both U.S. and Japanese managers at all the transplants we visited, as well as many workers, felt that it was too early for implementation of a full Japanese-style rotation system and that it may be a few years before workers have enough basic skills and knowledge to be moved regularly from team to team.

*Inventory control.* In Japan, production takes place according to the "just-in-time" system of inventory control in which materials are forwarded as needed and inventory is kept to a minimum (Monden 1982; Cusumano 1985). All the assemblers and over two-thirds of suppliers (68.5 percent) use a just-in-time system of production control.

The supplier survey asked: "How similar is your manufacturing process to one that might be found in Japan?" Eighty-six percent of the respondents said that their U.S. manufacturing practice was either "exactly the same" or "very similar" to one that might be found in Japan; only one supplier said that it was not at all similar.

### *The Division of Labor*

*Job classifications.* Few job classifications are a key characteristic of the Japanese model. This contrasts sharply with traditional U.S. production organization in which virtually every job has its

Table 2. Percentage of Transplant Parts Suppliers with Selected Japanese Intraorganizational Practices: U.S., 1988

| Characteristic | Percent | Number of Cases |
|---|---|---|
| *Work Organization* | | |
| Work teams | 76.7 | 73 |
| Rotation within teams | 87.0 | 69 |
| Rotation between teams | 66.2 | 68 |
| Just-in-time inventory control | 68.5 | 73 |
| *Worker Involvement* | | |
| Production workers maintain their own machines | 79.5 | 73 |
| Production workers do routine quality control | 98.6 | 73 |
| Production workers help design their own jobs | 60.9 | 69 |
| *Division of Labor* | | |
| Number of job classifications: | | |
| 1 | 34.3 | 67 |
| 2 | 14.9 | 67 |
| 3 | 16.4 | 67 |
| 4 | 14.9 | 67 |
| 5 | 6.0 | 67 |

own job classification and job classifications are seen by workers and unions as a "job ladder" that provides the basis for wage increases and employment security. Kochan et al. (1986) report that the unionized plants in a multidivisional U.S. manufacturing firm had an average of 96 job classifications. Table 1 indicates that transplant assemblers use no more than four job classifications, whereas a representative traditional U.S. Big Three auto maker had 90. The implementation of few job classifications might seem especially difficult at transplants which employ a large number of managers and workers that were originally socialized to traditional Big Three practices, e.g. NUMMI which has a large percentage of former GM workers. However, our interviews with NUMMI officials and workers indicated few adaptation problems.

More than 85 percent of transplant suppliers use five or fewer job classifications for production workers; and one-third use only one job classification. Several indicate that they have instituted more job classifications than would be ideal (as many as ten) to keep American workers happy by providing the appearance of an internal career ladder.

*Team leaders.* Japanese production organization includes a class of workers, referred to as "team leaders," who are members of shopfloor work groups but also have managerial responsibility for immediate production activities. There are no foremen or low-level managers whose job is to supervise shopfloor workers. Team leaders are used at all the transplant assemblers we visited, and 84 percent of suppliers use them as well. At Honda, Toyota, NUMMI, Nissan, and SIA team leaders are the first line of supervision and play a crucial role in the organization, design, and allocation of work on a daily basis. At some transplants, team leaders are selected by management, while at others, especially the unionized transplants, team leaders are selected by joint labor-management committees. All the transplants consider the input of workers to be an important criterion for the selection of team leaders.

*Status distinctions.* Overt status distinctions between management and blue-collar workers are less evident in Japan than in the U.S. For example, in Japan workers and managers eat in the same cafeteria; middle level managers wear the same uniforms as shopfloor workers. Managers typically do not have enclosed offices but sit at desks on a large open floor adjacent to the production facility. All transplants we visited had single cafeterias. At Nippondenso, all executives including the President work at desks on the floor. Nissan is the only transplant in which status distinctions are more visible, e.g., a separate parking lot for top managers' cars and plush "American-style" offices. This may be because Nissan has a much higher percentage of former American automobile executives than other transplants. All the transplants provide uniforms, although some give workers the option of wearing street clothes. Transplant officials we interviewed suggested that uniforms create an identification between workers and the company. Most top executives wear company uniforms, although Nissan is again the exception. In fact, the transplants tend to have greater visible status equality than obtains in Japan where top executives have chauffeured company automobiles and wear suits and ties rather than work uniforms.

*Hierarchy.* Lincoln, Hamada, and McBride (1986) indicated that management hierarchies are taller in Japan than in the U.S. Our findings suggest that management hierarchies in the automotive transplants are relatively flat. At Honda, there are nine levels in the internal hierarchy: associate, team leader, coordinator, department manager, plant manager, assistant vice president, senior vice president, executive vice president, and president. This structure is typical of the other

transplants as well. At Honda, the various vice presidents do not form separate levels in the reporting structure, but are part of Honda's senior management team, which includes the plant manager and the president of Honda of America Manufacturing. This senior management team makes decisions as a group and thus functions to some extent as a single reporting level. The president of Honda America is a member of and reports to the Board of Directors for Honda Japan. A number of shopfloor workers have risen to management ranks at Honda and the company actively encourages such mobility. Toyota officials indicate that shopfloor workers are recruited for middle-level management positions in the factory and the front office.

### *Worker Participation and Quality Control*

It is important to distinguish between the form of Japanese organization and its substance, i.e., its effects on worker behavior. A main objective of the Japanese system of work and production organization is to harness the collective intelligence of workers for continuous product and process improvement (Kenney and Florida 1988, 1989). This stands in sharp contrast to traditional American automobile industry practices in which there are formal and informal organizational barriers and norms that inhibit the use of worker intelligence (Braverman 1974). In Japan, workers actively participate in company suggestion programs and quality control circles as well as informal, everyday "*kaizen*," or continuous improvement activities. In Japan, different automobile corporations emphasize different aspects of *kaizen* activity. Toyota places greater emphasis on team activities, like quality circles, whereas Honda emphasizes individual initiative and innovation. Japanese scholars use the concept of "voluntarism" to explain the extraordinary initiative of workers in Japan. However, Japanese automobile companies vary significantly in their ability to generate "voluntaristic" behavior — with Toyota being the most effective.

*Worker initiative.* Transplants encourage worker initiative through the delegation of managerial authority and responsibility to shopfloor workers. Workers at the transplants, especially Honda and Toyota, have significant input into the design of their jobs. More than 60 percent of respondents to the supplier survey indicate that workers are involved in the design of their tasks. At Toyota and Nippondenso, work teams actually design standardized task descriptions for their work units and post them in the form of drawings and photographs with captions at their work stations. Roughly 80 percent of suppliers indicate that workers are responsible for routine maintenance on their own machines.

Japanese corporations use suggestion systems to harness workers' knowledge and ideas. Honda and Toyota have fairly well-developed suggestion systems. Although Mazda has a suggestion system, Mazda workers have occasionally boycotted it to express their dissatisfaction with management policy. SIA does not yet have a suggestion system, although management indicates that the company will institute one in the future. Thirty percent of transplant suppliers provide cash awards for worker suggestions, and two-thirds report that "willingness to suggest new ideas" is a key criterion for evaluating production workers for wage increases.

*Quality circles.* Quality circles are an important element of the Japanese system (Cole 1989a; Lillrank and Kano 1989). In Japan, quality circles are groups of workers who devote effort outside regular working hours to improving an element of the production process. According to Lincoln et al. (1986, p. 354), 76 percent of employees in a sample of Japanese plants participated in quality circles compared to 27 percent of workers in U.S. plants. The transplants vary in the extent and intensiveness with which they employ quality circles. Toyota and Honda use quality circles extensively, Mazda and NUMMI "moderately," and SIA not at all. Slightly less than half of suppliers use quality circles, and 68 percent of those who do not use quality control circles plan to do so in the future.

Transplant assemblers pay workers for quality circle activity. Of suppliers that use quality circles, 83 percent pay workers for hours spent working on quality circles. In both transplant assemblers and suppliers, participation in quality circles usually occurs immediately before or after shift work. Several transplants conduct competitions between quality control circles and use prizes, plaques, and cash awards as additional incentives for quality circle participation. Some transplants have sent American quality circles to Japan to participate in annual company competitions. All the transplant assemblers and suppliers that we visited indicated that they will devote significant effort to establishing quality control circles on a par with Japan. We thus agree with Cole's assessment (1989, pp. 111-12) that it is still too early in the transfer process to expect full use of quality control circles. Such activity will

likely increase as the transplants complete the process of implanting organizational forms and move on to more subtle techniques of shaping and motivating worker initiative.

We also asked Japanese managers to tell us how much, in percentage terms, Japanese *kaizen* or continuous improvement activity they have been able to replicate in their American work force. Honda executives feel they have completely replicated Japanese practice in their Marysville, Ohio plant. A Toyota manager who has worked in numerous Toyota plants in Japan as well as at NUMMI and Georgetown, Kentucky, indicated the Georgetown plant is at 60 percent of Japanese practice and NUMMI at 40 to 50 percent. Management is actively trying to implement greater *kaizen* activities. Nippondenso, a Toyota group member, has also closely replicated Japanese practice. Mazda and Nissan have had more difficulty implementing *kaizen* activity, and stand at roughly 50 percent of Japanese practice. Executives of SIA, which is the most recent transplant, estimate that the plant is currently at about 30 percent of Japanese practice. Still, the progress of the transplants on this dimension is remarkable, given the limited time they have had to socialize American workers to the requirements of Japanese production.

The central role played by worker initiative and the use of workers' knowledge contradicts the view that the Japanese model is simply an extension of fordist mass production. It lends support to the alternative conceptualization that it is a new and potential successor model based upon harnessing workers' intellectual and physical capabilities.

Transplants recognize this deficit and are working hard to replicate the worker initiative and voluntaristic behavior of Japanese firms. Numerous Japanese executives see the lack of independent initiative of American workers as a product of previous attitudes and socialization, and suggest that it can be changed by education and socialization to Japanese practices. According to the Japanese president of a transplant supplier, education and effort is required to "remove American barriers to worker initiative." Managers at the transplants indicate that they will concentrate on this issue in the next few years. Going even further, Toyota is working with the local school system to redesign curriculum and other socialization mechanisms to impart group-oriented behavior, problem solving, and initiative to students. SIA has also sent local school officials to Japan so that they can learn more about Japanese group-oriented educational practice.

*Work Force Selection and Socialization*

Japanese corporations do not simply impose Japanese production organization and manufacturing practice on their American work forces. Instead, they use a number of selection and socialization mechanisms to ensure effective transfer.

*Selection.* Recruitment and selection processes identify workers who possess initiative, are dedicated to the corporation, work well in teams, and do not miss work. The process differs from the recruitment policies of Japanese corporations in Japan (Rosenbaum and Kariya 1989) but serves a similar function. Moreover, the process differs markedly from the typical U.S. practice of hiring "off the street." The transplants subject potential workers to cognitive and psychological tests and other screening procedures to identify workers who "fit" the Japanese model. Previous job records or high school records are scrutinized for absenteeism. Potential employees go through extensive interviews with personnel officials, managers, and even members of their potential work teams to rate their initiative and group-oriented characteristics. While theorists have generally treated the so-called "loyalty" of the Japanese work force as a product of Japanese culture, the screening and selection process constitutes an organizational mechanism that selects potentially "loyal" workers from a large, diverse population. Simply put, this long held "cultural" effect is also a product of organizational practice.

*Socialization.* Prior to start-up, all the assembly transplants sent key employees (e.g., managers and team leaders) to Japanese sister plants for three to six months. There they received both formal training and informal socialization to Japanese practice (e.g., team work and *kaizen*). They worked closely with veteran Japanese "trainers," who transfer formal and tacit knowledge of production and who function as role models to some extent. Workers and trainers also spent time together outside work to continue the socialization process. These trainers then came to the U.S. for periods from three months to two years to work alongside the same U.S. employees and their teams. The supplier survey indicates that 33 percent of American managers were sent to Japan for training. According to workers at different transplants, "trainers" provided the most substantial and significant exposure to Japanese practices.

The transplants use ongoing training and socialization programs to acclimate workers to Japanese production. Most employees begin with a six- to eight-week introductory session that in-

cludes an overview of automotive assembly and fairly rigorous socialization in the Japanese model. After this, workers are assigned to teams where they continue to learn from senior employees. According to the survey, suppliers provide an average of eight days of training for factory workers before they assume shopfloor activities (range = 0-180 days); assemblers have longer training periods. This is supplemented by an average of 61 days additional training on the shopfloor (range = 1-302 days).

*Adaptation.* Shopfloor workers in the U.S. have experienced few problems adapting to the Japanese system. NUMMI workers who previously worked for GM indicate that they prefer the Japanese model to U.S. fordist practice. According to one: "I was at GM and the part I didn't like — which I like now — is that we had a lot of drug and alcohol problems. It was getting to the point, even with me, when it got around lunchtime I had to go out . . . and take down two or three beers." Mazda has had the most adaptation problems including significant worker discontent and the recent election of a new union local that is less conciliatory toward management. However, Mazda workers indicate that such adaptation problems are largely due to management's failure to fully implement Japanese production organization, e.g., by not rotating workers to prevent repetitive motion injury.

Management has been the source of recurring adaptation problems at the transplants. During site visits and interviews, we were told repeatedly that American middle managers, especially those recruited from U.S. automobile corporations, have experienced great difficulty adapting to Japanese production organization and management. Honda officials indicate that the previously formed attitudes and prejudices of U.S. middle managers toward factory workers are a serious problem. White and Trevor (1983) documented a similar problem in U.K. transplants. NUMMI workers complain that American managers still operating in the GM style are a major obstacle to implementation of a full-blown Japanese system that they see as more favorable to workers than the old fordist system. According to a NUMMI worker: "A lot of things have changed. But see, you hear people talk. You hear them saying once in a while: 'Oh, we're going back to the GM ways.' I hope not. That was rough. . . . I think to completely bring back the Japanese way, Japan would have to take over the plant completely and have nothing to do with General Motors at all." Japanese transplant managers indicate that problems with American middle managers have encouraged them to promote shopfloor workers to supervisory positions.

### *Wages and Labor-Management Relations*

In any industrial system, the immediate organization of production is reflected in rules, regulations, and norms that form the context in which production takes place. This broader production environment includes wage rates, wage determination, the organization and function of the internal labor market, degree of tenure security, type of unionization, and pattern of labor relations. These factors create incentives for work effort, establish the context for labor-management relations, and form the framework for mobilizing employee demands and mediating disputes. In Burawoy's (1979) terminology, they provide the social context for the "manufacture of consent."

*Wages and bonuses.* The Japanese "*nenko*" system of wage determination is based on a combination of seniority, job-related performance, and the ability to work in a group context (Suzuki 1976; Gordon 1985; Kagono, Nonaka, Sakikabara, and Okumura 1985). Semiannual bonuses constituting roughly 30 percent of total remuneration are used to supplement regular pay (Aoki 1988).

As in Japan, transplant assemblers and suppliers pay relatively high wages. Transplant assemblers pay average annual wages between $28,598 and $36,013 dollars, compared to an average of $36,089 for Big Three auto makers (Table 1). Workers in transplant assembly plants can earn over $50,000 when overtime is included. Hourly wages for regular production workers in transplant assembly plants range between $13.94 and $16.81 per hour, compared to an average of $16.41 at Big Three firms (Table 1). Transplant suppliers also pay relatively high wages, $7.21 per hour to start and $8.00 after a year on the job for "low skill" workers, to more than $11.00 for "high skill" workers — a rate which is slightly below the wage levels at U.S. parts suppliers (U.S. International Trade Commission 1987). Total annual compensation at the transplant suppliers averages $21,200 per year. This wage differential between assemblers and suppliers is roughly similar to that in Japan.

The wage levels and wage determination policies of the transplants are more standardized and uniform than in Japan. This is somewhat striking because academic studies and conventional wisdom contrast American "individualism" to Japa-

nese "familism." Transplant assemblers pay uniform wages for each class of workers, with raises at regular intervals. Transplant suppliers report that work effort, absenteeism, "willingness to work in teams," and "willingness to suggest new ideas" are the major criteria used to evaluate workers for wage increases and promotions.

Bonuses are not as common in the transplants as they are in Japan, and they are not an important component of employee wages. Bonuses at the transplants tend to be across-the-board, equal-percentage wage supplements to all workers. Honda provides a monthly bonus of $100 for perfect attendance. Bonuses represent only 1 percent of total compensation for transplant suppliers. However, 49 percent of transplant suppliers provide small cash awards for attendance, 30 percent provide small cash awards for suggestions, and 18 percent provide small cash awards for participation in quality circles.

*Job security.* "Permanent employment," or more appropriately, long-term employment tenure, is a much discussed feature of the Japanese system (Abegglen 1958; Taira 1970; Dore 1973; Cole 1979; Lincoln and Kalleberg 1985). The pattern of employment security differs between unionized and nonunionized assembly transplants, and between assemblers and suppliers. Our review of the labor-management agreements for the unionized assembly transplants indicates that all of them have formal contractual agreements that stipulate tenure security, "guaranteeing" jobs except under conditions that jeopardize the financial viability of the company. Both NUMMI and Mazda have fulfilled their commitment to no layoffs. NUMMI has kept full employment during periods of up to 30 percent reduction in output by eliminating overtime, slowing the work pace, offering workers voluntary vacation time, placing workers in special training programs, or transferring them to other jobs. Mazda workers have been loaned to local governments during slowdowns. The nonunionized transplants provide informal assurance of tenure security, although this is not reflected in contractual agreements with workers. Nissan and Toyota have redeployed workers to other jobs to avoid layoffs. However, it is impossible to know at this stage whether the nonunionized transplants will remain committed to tenure security in the event of a severe economic downturn.

Transplant suppliers do not offer formal guarantees of tenure security. However, more than two-thirds of the supplier respondents indicate that the Japanese long-term employment system should be transferred to the U.S. Nevertheless, they offered a wide range of opinions on this issue — some saw long-term employment as a source of long-run productivity increases, others saw the threat of termination as a way to motivate American workers.

*Unionization.* The Japanese system of unionization is one of enterprise or "company" unions (Taira 1961; Shirai 1983), which differs markedly from the prevailing U.S. practice of industrial unionism. However, Levine (1958), Taira (1961), and Koike (1988) observed that the U.S. has always had a system of decentralized plant-specific "locals" that operate in a way that is similar to enterprise unions by aggregating worker demands and establishing the context of labor-management relations at the plant level.[4]

The transplants have developed two basic strategies to cope with U.S. labor relations and to recreate some elements of Japanese industrial relations. Most automobile transplants have simply chosen to avoid unionization. Only 4 of the 71 supplier respondents were unionized. The four nonunionized assemblers — Honda, Toyota, Nissan and SIA — have chosen rural "greenfield locations" at least in part to avoid unionization. Nissan went to great lengths to defeat a unionization drive. SIA has implemented an in-plant video system to communicate messages to workers in anticipation of a unionization campaign. Nonunionized transplants, notably Nissan and Toyota, use employee "handbooks" that provide plant rules and regulations and have formed "employee associations" that collect employee input and create a stable structure through which work-related grievances can be addressed. The unionized transplants, Mazda, NUMMI, and Diamond-Star, have established independent agreements with their respective union locals that enlist the union in the implementation of Japanese work organization. These agreements allow fewer job classifications and more flexible work rules and utilize pay systems that differ markedly from the typical U.S. assembly plant.

*Work force segmentation.* The transplants are recreating aspects of Japan's highly segmented or "dual" labor markets (see Koike 1988; Kalleberg and Lincoln 1988). In Japan, for example, a large manufacturing facility will typically have nonunionized temporary workers or lower-paid

[4] The U.S. industrial relations system is experiencing a general decentralization of such functions to the local level. For example, the new GM Saturn plant in Tennessee has instituted an agreement with unique provisions.

workers from subcontractors working side-by-side with regular employees. The transplants use part-time or temporary employees to provide flexibility. At both Mazda and Diamond-Star, temporary employees were laid off during a downturn in the automobile market in early 1990 (Guiles and Miller 1990). The use of temporary workers has been a source of ongoing labor-management conflict at Mazda where (in contrast to Japan) union leaders see temporary workers as a threat to labor solidarity.

Gender is the most common basis of work force segmentation in Japan. Japanese women are prohibited from working in assembly plants by Japanese laws that make it illegal for women to work the night shift. The transplants do not show the extreme pattern of gender-based segmentation that is common in Japan. The supplier survey indicates that women comprise 34 percent of production workers. However, women are only 10 percent of the management work force.

Race is a typical line of work force segmentation in the U.S. Earlier research (Cole and Deskins 1988) inferred racial bias from the site selection and work force composition of Japanese transplants. We did not see large or even representative numbers of minorities in site visits. According to the supplier survey, minorities fill 11 percent of production positions and 9 percent of management slots. Recent data indicate that the transplant assemblers are hiring relatively more minority workers in production jobs. For example, Honda has increased minority employment from 2.8 percent in 1989 to 10.6 percent in 1990. Similarly, Toyota in Kentucky reports that 15 percent of its employees are nonwhite (also see Cole 1989b). In all likelihood, this is a response to the political pressure that resulted from publicizing earlier hiring practices.

*Effects and implications.* The Japanese transplants have been successful in economic terms. In 1990, the transplants produced nearly 20 percent of all U.S. cars and are projected to increase this to between 40 and 50 percent of the U.S. market over the next five to ten years (Wharton Econometric Forecasting Associates 1990). Productivity comparisons done by the International Motor Vehicle Program at the Massachusetts Institute of Technology indicate that the transplants have productivity ratings that are as good as or better than U.S.-owned automobile assembly plants and comparable to their Japanese sister plants (Krafcik 1989; Womack et al. 1990).

The combined economic and organizational success of the transplants is exerting a powerful demonstration effect on U.S. automobile corporations, resulting in the imitation and diffusion of Japanese practices. The diffusion process has been accelerated by joint ventures with Big Three auto makers, some of which (e.g., NUMMI) were organized explicitly to educate U.S. managers. Furthermore, union leadership is pressing to apply transplant job security provisions to U.S. firms. Each of the Big Three auto makers currently operates plants (e.g., GM's Saturn) that use the "team concept," few job classifications, pay-for-performance, and other organizational practices that have been influenced by the Japanese. However, a recent study (Kochan and Cutcher-Gershenfeld 1988) suggests that U.S. reforms are essentially "hybrid forms" in which workers are grouped in teams but not given decentralized decision-making authority. Whereas the literature predicts convergence of Japanese transplants toward the U.S. model, the reverse is occurring as U.S. producers adopt elements of the Japanese model. This further reinforces the contention that the Japanese model is a potentially generalizable successor to fordist mass production.

*Summary.* Our findings indicate that both transplant assemblers and suppliers have been remarkably successful in implanting the Japanese system of work organization in the U.S. environment. The basic form of Japanese work organization has been transferred with little if any modification. There are differences in the extent to which the transplants have been able to replicate Japanese behavior in *kaizen*, quality circles and other such activity, but they are working hard to increase the participation of U.S. workers in these activities. Japanese wage determination and labor relations practices have been somewhat modified to fit the U.S. context. However, these practices still resemble Japanese more than U.S. traditions. In sum, our findings are in line with the hypothesis that the Japanese model is a set of organizational practices that can be removed from the Japanese environment and successfully implanted elsewhere. However, we do not imply that the transfer process has occurred automatically. Japanese firms have taken great care to select and even to alter the environment to make it conducive to new organizational forms.

## TRANSFER OF INTERORGANIZATIONAL RELATIONS

The Japanese system of interorganizational relations differs markedly from that of the U.S. The Japanese "just-in-time" system of supplier rela-

tions is characterized by close geographic proximity of producers, long-term relationships, and tight interfirm linkages characterized by personnel sharing, joint participation in product development, and regular communication and interaction (Asanuma 1985; Odaka, Ono and Adachi 1988). In Japan, suppliers provide as much as 70 percent of a car's components, while U.S. automobile assemblers rely on suppliers for 30 to 50 percent of inputs (Mitsubishi Research Institute 1987; U.S. International Trade Commission 1987). The Japanese supplier system is organized in a pyramidal structure with 500 first-tier suppliers, a few thousand second-tier suppliers and more than 20,000 tertiary automotive parts suppliers (Sayer 1986; Nishiguchi 1987; Sheard 1983). The parent or "hub" company plays a key role by structuring linkages and coordinating flows within the network (Florida and Kenney 1990b). The Japanese supplier system is embedded in a set of organizational relationships that structure economic behavior. Dore (1983) advanced the concept of "relational contracting" to capture elements of the Japanese system and to contrast it with the "arm's length" system of the U.S. (Altshuler et al. 1984).

Japanese assembly transplants initially located facilities in the lower Midwestern region of the United States to take advantage of the indigenous infrastructure of domestic automobile parts suppliers. However, indigenous supplier firms were unable to adapt to the delivery and quality requirements of Japanese just-in-time system. Dismayed by the performance of U.S. suppliers, assembly transplants encouraged their first-tier Japanese suppliers to locate in the U.S. The Japanese suppliers, in turn, found it in their interest to expand overseas. In effect, the creation of a Japanese system of interorganizational relations in the U.S. was a "creative response" (Schumpeter 1947) to the deficiencies of the U.S. environment.

Transplant assemblers have played an active role in the creation of this new production environment by financing and helping to set up U.S. branches for key suppliers. For example, Honda encouraged two of its Japanese suppliers to form Bellemar Parts to supply it with seat subassemblies. In another instance, Honda provided technical and financial assistance to a group of Japanese suppliers to form KTH Parts Industries, a company that took over U.S. production of chassis parts that were once produced in-house by Honda at Marysville. Nearly half of Honda's main suppliers in Japan now operate U.S. plants. The supplier survey indicates that 12 of 73 suppliers are partially owned by the assemblers they supply.

Furthermore, assemblers played a key role in influencing both the original decision of transplant suppliers to relocate production in the U.S. and their choice of locations in the U.S. According to the supplier survey, more than 75 percent set up U.S. operations to maintain close ties to a major Japanese customer, and 90 percent chose their specific locations to be close to a major customer. Traditional environmental factors like the local labor market or local labor costs have had relatively little impact on locational choices. Recently, other Japanese parts suppliers have opened U.S. plants on their own initiative to access the growing market for their products. Most of the supplier plants are located in states with transplant assembly plants. The strong role played by large assemblers in orienting and structuring the transplant supplier complexes contradicts the claim (Sabel 1989; Friedman 1988) that the Japanese model is converging toward small-firm flexible specialization.

### *Supplier Relations*

Table 3 summarizes data from the supplier survey on the main characteristics of relations among transplant assemblers and suppliers. This table reports the responses of 73 transplant suppliers on their supply relationships with transplant assemblers and with their own "second-tier" suppliers. Geographic proximity is a basic characteristic of the Japanese supplier relations (Sayer 1986). Among transplant suppliers, 40 percent are located within a two-hour shipping radius of end-users, and almost 90 percent are located within an eight-hour radius. Eighty percent make just-in-time deliveries. Still, the distances separating end-users from suppliers are somewhat greater in the United States than in Japan. Transplant complexes are essentially "stretched out" versions of Japan's geographically concentrated just-in-time system of interorganizational linkages. This is likely due to the greater availability of land, well-developed highway systems, larger trucks, and greater storage capacity in the U.S.

*Interaction and information exchange.* Table 3 reveals a continuous exchange of information between transplant assemblers and suppliers. Approximately 97 percent of transplant suppliers are contacted immediately by phone when they deliver a defective product. Eighty-two percent indicate that engineers from their major customer came on-site while they were setting up

Table 3. Percentage of Transplant First-Tier Suppliers with Selected Japanese Interorganizational Linkages: U.S., 1988

| Characteristic | Linkages to Assemblers | | Linkages to Second-Tier Suppliers | |
|---|---|---|---|---|
| | % | N | % | N |
| *Transit time* | | | | |
| 1/2 hour | 6.9 | 72 | — | — |
| 1/2 hour-2 hours | 33.3 | 72 | — | — |
| 2-8 hours | 38.9 | 72 | — | — |
| 8-24 hours | 9.7 | 72 | — | — |
| Deliver according to just-in-time schedule | 80.0 | 70 | 43.1 | 72 |
| Immediate feedback on defective parts | 97.2 | 72 | 97.2 | 72 |
| *Customers' engineers visit plant site* | | | | |
| For quality control problems | 96.8 | 62 | 96.9 | 65 |
| For production problems | 74.2 | 62 | 83.1 | 65 |
| *Interaction in design* | | | | |
| Close interaction between supplier and customer | 50.0 | 72 | 33.8 | 71 |
| Supplier bids on customer design | 31.9 | 72 | 62.0 | 71 |
| Supplier can alter customer design | 22.2 | 72 | 11.3 | 71 |
| Supplier designs subject to customer approval | 15.3 | 72 | 11.3 | 71 |
| Supplier designs but customer can alter | 6.9 | 72 | 8.5 | 71 |

U.S. operations, three-quarters report that engineers from their major customer make ongoing site visits to deal with production problems, and 97 percent indicate that engineers from their major customer make ongoing site visits to deal with quality control problems.

*Joint product development.* Joint participation in design and development is another key characteristic of Japanese supplier relations. Fifty percent of suppliers said they participate closely with assemblers in the development of new products. This includes interaction with U.S.-owned firms as well. Honda engineers, for example, developed new production techniques for a small Ohio plastics firms that became a Honda supplier. Honda, Toyota, and SIA send teams of engineers and shopfloor workers to consult with suppliers on new product designs and production machinery. Honda intends to use its Marysville R&D center to integrate both transplant and U.S. suppliers into the future design of cars. We thus conclude that Japanese interorganizational practices like high levels of interaction, joint development, and long-term contracts, which typically have been viewed as a function of Japan's sociocultural environment, are actually a product of the organizational relation itself.

*Supplier tiers.* In Japan, first-tier suppliers play a critical role in organizing and coordinating supply flows between lower-level suppliers and main assembly plants. They are located close to assemblers, interact frequently with them, and often are at least partially owned by them (Asanuma 1985). First-tier suppliers are probably more important in transplant complexes. For example, the windshields for Honda's American-made vehicles originate at PPG, an American producer. PPG supplies windshields to a Japanese supplier, AP Technoglass, twice a week. AP Technoglass screens them for defects, cuts and grinds them, and delivers them to a Honda subsidiary, Bellemar Parts, twice a day. Bellemar, which is located one mile from the Honda plant, applies rubber seals to the windshields and makes just-in-time deliveries to Honda every two hours. Bellemar also screens for defects, so that Honda receives much higher quality windshields than it would without its suppliers. In this way, suppliers serve as a "buffer" between assemblers and the environment.

Table 3 reveals the pyramidal nature of transplant supplier relations. Second-tier suppliers, who supply to the first-tier suppliers, have less interaction in design or development of new products. One-third of first-tier suppliers integrate second-tier suppliers in new product development. Just 43 percent of the first-tier suppliers receive just-in-time deliveries from their second-tier suppliers, whereas in Japan, tight interorganizational relations extend to second- and third-tier suppliers. However, this may be due to the fact that the transplant complex is still in the process of formation so linkages are at an early stage of development. Other evidence indicates that linkages are being extended down through the hierarchy to producers of basic inputs like steel, rubber and tires, and automotive plastics (Kenney and Florida 1991).

*Integration of and diffusion to U.S. suppliers.* Transplant assemblers are forging interorganizational linkages to U.S. producers, leading to the rapid diffusion of Japanese practices among U.S. producers. Over half of Mazda's U.S. suppliers

are U.S.-owned firms: 43 of Mazda's 96 suppliers are independent U.S.-owned firms, 10 are owned by Ford, and 43 are Japanese-owned or Japanese-U.S. joint ventures (*Automotive News* 1989). Helper (1990) indicated that 41 percent of 437 U.S. automotive suppliers surveyed supplied at least one component to the transplants.

Transplant assemblers work with U.S. suppliers to accelerate the diffusion of Japanese practices. As in Japan, Toyota has set up an organization of its Kentucky suppliers, the Bluegrass Automotive Manufacturers Association (BAMA), and has held meetings with U.S. suppliers in Las Vegas and Japan to encourage diffusion of Japanese practices. NUMMI has organized a supplier council of 70 mostly U.S.-owned suppliers to share information and facilitate product improvement (Krafcik 1986). SIA has organized teams of engineers, purchasing representatives, and manufacturing people who work with suppliers to improve quality. Johnson Controls, an American-owned automotive supplier in Georgetown, Kentucky, is now the sole source supplier of seats for the Toyota Camry. Toyota has worked with the company to implement a full-blown Japanese production system. Johnson Controls delivers completed subassemblies to Toyota according to just-in-time requirements every four hours. We visited a ten-person small machine shop in rural Ohio that formerly rebuilt tractor engines, but now rebuilds robot heads for Honda and Honda suppliers.

The emergence of a new system of Japanese supplier relations in the U.S. is exerting a sizable demonstration effect on U.S. practice. Helper (1989) provided empirical evidence of U.S. convergence toward the Japanese model. Rather than taking on characteristics of U.S. suppliers or the broader environment of U.S. supplier relations, the Japanese transplants are transforming existing patterns of interorganizational relations in the U.S.

*Summary.* Our research indicates that the Japanese system of interorganizational relationships has been successfully transferred to the U.S. The Japanese transplants show little sign of conforming to the prevailing U.S. model of organization. Instead, the transplants have acted on the environment to create the resources and conditions they need to function. Furthermore, our findings reveal considerable symmetry or congruence between intra- and interorganizational relations. The Japanese transplants replicate in their external relations with suppliers the long-term relations, high levels of interaction, and joint problem-solving typical of their internal relations. Features such as mutual dependence, shared problem solving, and continuous interaction, which are thought to be a function of Japan's sociocultural environment, can be better explained as part of the interorganizational relationship itself.

## CONCLUSION

Our findings may come as a surprise, given the legacy, conceptual orientation, and predictions of industrial sociology and organization theory. These theories imply that the environment has a strong effect on organizations, that it is difficult to transfer organizations between dissimilar environments, and that once transferred, organizations tend to take on characteristics of the new environment. At the intraorganizational level, however, the transplants have effectively recreated the basic Japanese system of production organization and are working hard to implant it fully. At the interorganizational level, the transplants have recreated the Japan's "relational contracting" system, establishing a new production environment for automobile manufacture. Thus, our findings suggest that too much explanatory power has been given to cultural factors in organizational development. Outside the plant as well as inside, the Japanese model forms a set of organizational practices that has been effectively transferred to the U.S.

On a more general level, our research suggests a general symmetry between intra- and interorganizational characteristics. The Japanese transplants have replicated long-term, interactive, participative, and/or mutually dependent relations at both the intra- and interorganizational levels. These findings are not specific to the transplants but are reflected in comparative institutional research — the U.S. pattern of short-term adversarial labor-management relations is reflected in the short-term "arm's length" pattern of U.S. supplier relations. We believe that there may be an underlying rationale for such symmetry. Organizational pressures and incentives may lead to increasing continuity in the governance structures inside and outside the firm. Firms that effectively organize intraorganizational activity are likely to replicate it in dealings with external firms as well. More research and theory-building are needed on this crucial issue, using other sectors, industries, and types of organizations.

Our research indicates that organizations can and do shape their environments. Thus, the concept of environmental "embeddedness" should

be revised to incorporate measures of the power, intentions, and purposeful activities of organizations. Transferring organizational practices and forms from one society to another means that they must be uncoupled from the environment in which they are embedded and recreated in the new environment. The transplants provide clear evidence that organizational forms can be effectively lifted from an originally supportive context and transferred to a foreign environment. Furthermore, they show that organizations can mold the new environment to their needs and to some degree create the conditions of their own embeddedness. In general terms then, organizations have the resources to alter the environment. Large powerful firms, for example, can control the machines, the organization of production, the hiring of employees, and the establishment of interorganizational connections. These organizational resources can be used to offset and transform the "social matrix" of the environment.

We do not wish to imply that any type of organization can be made to fit any environment. The German automobile manufacturer, Volkswagen, failed to implement its production organization in the U.S. context — its U.S. plant experienced high levels of worker discontent, serious strikes, and was closed after less then ten years of operation. Successful organizational transfer is neither natural nor automatic; it hinges on the strategic actions organizations take to shape the environment to meet their requirements. Based on our findings, we conclude that the organizational-environmental tie works in both directions.

Finally, our research provides useful insights for the debate over new forms of production and industrial organization. The findings resonate with the general notion of a movement toward new models of production organization; the transplants reflect the more general restructuring of production organization, supplier relations, and industrial networks. However, we find little evidence to support the claim made by Sabel (1989) that the Japanese model, as manifested by the transplants, is converging toward flexible specialization. In fact, the evidence clearly suggests that U.S. firms are converging toward the Japanese model. By focussing on what is or can be transferred, our research reveals three defining features of the Japanese model: (1) high levels of task integration, (2) integration of workers' intelligence as well as physical capabilities, and (3) tightly networked production complexes. In organizational terms, the transplants, and the Japanese model in general, display a high degree of *functional integration* that differs markedly from previous forms of functional (and/or flexible) specialization. Based on our findings here and related research on U.S. high-technology industrial organization (Florida and Kenney 1990a, 1990b), we believe that these features may be the underlying and defining elements that will determine the success, survival, and diffusion of the competing models of production organization that are emerging around the world. It remains for future research to further assess the broad generality of these trends.

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