From the Diffusion of Lean Production to the Hybridization Perspective : Studies on the Transfer of the Japanese Production System to the U.S.

Journal of International Economic Studies (2000), No.14, 27-40

From the Diffusion of Lean Production to the Hybridization Perspective:

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Abstract

For more than two decades now, groups of American researchers have studied the Japanese production system, in response to economic events. The first event was an increase of imports from Japan. The second was the transfer of the Japanese system to the U. S. American researchers developed the term "lean production" based on their field research in automotive plants throughout the world. They went on field research to transplants of Japanese firms and emulators among indigenous firms. The theme of their study was the transferability of the Japanese system to the U. S. They reached the perspective of hybridization through field studies on transplants and emulators. This paper aims to trace the evolutionary process of studies on the Japanese production system and its transfer to the U. S. These studies defined specific features of the production system and raised productive issues regarding organizational transfers across borders.

1. Introduction

This paper aims to identify research studies on the transfer of the Japanese production system into the USA, and to clarify points at issue. In the 1980s, the Japanese production system was seen as an alternative model to traditional mass production. It was evaluated as a model for industrial survival and adopted in various manufacturing sectors as well as in the automobile industry. Researchers gave the term "lean production" to the system that enables the elimination of waste and the production of high quality products. As lean production spread, researchers discovered that the system had been adopted in several patterns. The JMNESG (Japanese Multinational Enterprise Study Group) called these "hybrid" factories (Abo, 1994) and western researchers also accepted the idea into their analysis (Boyer et al., 1998, Liker et al, 1999). They accumulated empirical studies based on the idea and even raised theoretical perspectives. As the Japanese system spread into the USA with various forms of adoption, studies on lean production evolved into the hybridization perspective, which includes rich empirical researches as well as theoretical contributions.

Firstly, some explanation must be given of Abernathy's pioneering studies. In

the 1970s, American researchers began to gain interest in the Japanese production system, seeing it as an alternative to mass production, which had been defeated in international competition. Abernathy studied the limitations of the mass production system from the viewpoint of declining innovation. He focused his attention on Japan, where the flexible production system had been developed, and emphasized industrial revival not in macroeconomic policy but in the software of the micro organization, namely the flexible production system. Secondly, I will explain the studies on lean production and its theory by Womack et al. Thirdly, I will explain the hybridization perspective on the transfer of lean production to the United States. The transfer of lean production resulted in a kind of mixing with American methods. Researchers discovered various types of hybrid patterns, and also made productive theoretical studies.

2. Turning to the Japanese Production System

Some production models were presented as alternatives to the traditional mass production in the 1970s and early 1980s, when limitations to the viability of the traditional system were appearing. Prominent propositions included the Japanese model by Abernathy, and the Italian model by Piore and Sabel (Abernathy et al., 1984, Piore and Sabel, 1984). The latter presented a model of flexible specialization, based on the network of flexible small firms located in central and northwestern Italy. They claimed that although craft production and mass production had coexisted in the 19th century, mass production had limited the growth of craft systems. They called this the "first industrial divide." And now, they wrote, we are living through a second industrial divide which will lead back to the craft method of production, requiring an extension of existing regulatory institutions.

Abernathy analyzed the stagnation of technological innovation in the automobile industry by looking at production systems, and proposed a method of industrial revival through transformation of the traditional system into a flexible manufacturing system. He formulated a model for analyzing the evolutionary process of innovation both in product technology and manufacturing process technology. Based on this model, he precisely defined the stagnation of innovation in the American automobile industry, and called for it to be changed into the Japanese flexible system. His great work was *Productivity Dilemma: Roadblock to Innovation in the Automobile Industry* (Baltimore & London: The Johns Hopkins University Press, 1978). He clarified adverse interactions between innovation and productivity, based on an empirical study of the Ford Motor Company. He investigated the eight-decade-long history of product and process technology at Ford's engine plant and assembly plant. Based on a detailed analysis of technological development at the two productive units, he claimed that innovation had stagnated. In periods when innovation was stagnant, productivity increased, and when innovation was constant, productivity was sluggish. As the product and manufacturing processes developed, cost decreased, and product designs became more standardized. At the same time, manufacturing processes offered higher levels of productivity, and became dependent on specialized equipment. Change of equipment lagged behind model changes and blocked the smoothness of product development. Innovation became incremental. Productivity increases con-

tinued until the industry reached stagnation. "Stated generally, to achieve gains in productivity, there must be attendant losses in innovative capability" (Abernathy, 1978: 4). Although he presented a logic for stagnation in innovation, he left an opening for escaping the vicious circle. He proposed this answer in his next book, in the form of the logic of de-maturity of the industry.[1]

Abernathy et al. raised the problem of industrial revival, and found the Japanese production system to be an alternative model to mass production (Abernathy et al., 1984). He shed light on the shop floor system where workers' ideas and skills were integrated into the management organization, in a way completely different from American plants, basing this idea on field research at Japanese automotive plants. De-maturity is the condition where innovation requires a change in traditional production system which is composed of skills, systems and resources. The logic of de-maturity follows from this. The resilience of an industry takes place in four stages, considering that technological change has an influence upon both products and markets. The first stage is the 'Architectural Phase,' in which various product concepts are developed following appropriate production systems as well as suitable markets. The next two stages consist of incremental changes, with no radical changes of products, production systems or markets, and new product development for niche markets. The "Architectural Phase" sets the main course of the industry, where the basic design of the product is set, and it creates connections with markets. It is then followed by the "Regular Phase," where incremental technological change takes place. The dominant design controls the development path of the industry. This stage is characterized by the standardization of manufacturing processes and strengthened production systems. The third stage is called the "Niche Creation Phase." Some types of new products are offered during this stage, with changing relationships between products and markets. These two stages do not include radical changes of dominant designs or manufacturing systems, and therefore competitiveness does not continue for long. The fourth "Revolutionary Phase" is characterized by radical changes in product design and in the competitive conditions of the industry, threatening existing production systems. The de-maturity of industry takes place in the process of transformation from the "Regular Phase," where the industry is in a matured condition, to the "Revolutionary Phase," whose essential feature is the application of new technology to existing markets. Thus Abernathy connected a concept of innovation and product cycle with the foundation of the production system, based on in-depth analysis.

He uses this model to explain the historical development of the American automobile industry, by presenting information about innovation in drive trains. The first cycle began at the beginning of the 20th century, and the second in the 1930s/1940s. Various types of cars coexisted during the architectural phase in the early 20th century. Then came the regular phase, in which the Model T was developed by Henry Ford, and where both product standardization and process innovation in the flow of line production developed. The revolutionary phase appeared with the introduction of the closed steel body in the mid-1920s. The new body included various improvements in suspension systems, engine design, etc. The dominant design of the following 30 years was set by the development of the "rolling living rooms" in the 1930s and automatic transmission in the 1940s. Changes occurred from the late 1930s to the late 1950s, mainly involving incremental refinements and the creation of niche markets.

American automakers began to pay attention to compact cars, due to the increase of imports from Europe and Japan. Then the industry went through a new round of innovation in the 1970s, because of the oil shock. It was necessary to make changes in company organization to give a boost to the process of de-maturity. New organizations required managers to learn new relations among technology, market and production system. Here Abernathy focused his attention on Japanese automobile makers as learning organizations which were able to concentrate their employees' energy into company activities (Abernathy, 1984: 107-118).

Incidentally, the MIT research group, which developed the concept of lean production in 1990, published a book of collaborative work in 1984 (Altshuler et al., 1984). Although the book looked at various aspects of industry, and did not have a central unifying theme, it took a serious position toward the Japanese challenge. As a result the researchers reached an accurate understanding, which lead them to focus on the Japanese production system in their next research project. They argued that there were three phases of transformations in the automotive history. The first transformation was the breakthrough by American producers, around 1910, from custom building to mass production. The second occurred in Europe in the 1950s, when European producers combined mass production with an emphasis on product differentiation. The third began in Japan in the late 1960s, when Japanese auto producers began to make dramatic breakthroughs in production organization. The creative breakthrough in production systems and products promoted an explosion of demand in the domestic market, and resulted in export growth. They hypothesized that this would be followed by one of three scenarios, each leading to a new equilibrium. The first would be the concentration of automobile production to Japan from the USA and parts of Europe. The second would be rapid learning and cost reductions by Western producers, and a closing of the competitive gap with Japan. The third would be for governments to back national producers with subsidies or trade restraints. The second path was desirable, but producers and labor unions as well as governments faced the challenge of introducing new manufacturing technology (Altshuler et al., 1984: 247-252).[2]

3. "The Triumph of the Lean Production System"

Womack et al., organized the International Motor Vehicle Program (IMVP) at MIT in 1985, and performed research on the world's automobile plants. John F. Krafcik, a member of the program, published the article, "Triumph of the Lean Production System," in which he proposed the name "lean production" (Krafcik, 1988). He was a former manufacturig engineer at NUMMI, a GM-Toyota joint venture in California. He compared the Toyota production system with Fordism, terming the former "lean production" and the latter "buffered production." Fordism had many buffers: high inventory levels, many utility workers in preparation for high absenteeism, huge repair areas to compensate for poor assembly line quality. On the other hand, Toyota's production system was a lean operation without waste. Giving productivity, quality and flexibility as the primary indicators of plant performance, he presented the advantages of lean production over traditional mass production plants.

In 1990, Womack et al. published *The Machine that Changed the World,* which

made a great contribution to the academic field by showing the productivity and quality of the world's automobile plants, based on field research. They demonstrated the competitive advantage of the lean production over mass production, and clarified its universal character in terms of location. Also from the historical point of view, they proposed that lean production be spread throughout the world, presenting it as a stage in the evolutionary process of the production system; namely, from craft production to mass production, and then lean production.

Let us look at the performance of lean production, as this is a very important issue. Firstly, let us take the example of a 1986 comparison between a traditional mass production plant and a lean production plant. A comparison between two plants, GM's Framingham and Toyota's Takaoka, found that Takaoka stood at almost twice the level of Framingham in productivity, and three times in quality (Womack et al., 1990: 81). Gross assembly hours per car were 18.0 at Takaoka and 40.7 at Framingham. The adjusted assembly hours per car were 16 at Takaoka and 31 at Framingham. There were 45 assembly defects per 100 cars at Takaoka, versus 130 at Framingham. Secondly, a comparison was carried out in 1989 of assembly plants in Japan, America, and Europe. The productivity (hours per vehicle) was 16.8 at Japanese plants in Japan, 21.2 at Japanese plants in North America, 25.1 at American plants in North America and 36.2 at all plants in Europe. The quality (defects per 100 vehicles) was 60.0 at Japanese plants in Japan, 65.0 at Japanese plants in North America, 82.3 at American plants in North America and 97.0 at all plants in Europe. Looking at the regional differences in performance, we find that the highest was at the Japanese plants in Japan, followed by the Japanese plants in North America, and then American plants in North America. The lowest was at the European plants. Although it was surprising that the Japanese plants in North America performed similarly to American plants in North America, the European plants, which were the lowest among the developed regions, were shown to be still using mass production. In terms of plant characteristics, the size of the repair area (as % of assembly space), which is a good indicator of quality control on the shop floor, was 4.1 at Japanese plants in Japan, and 4.9 at Japanese plants in North America. The Japanese plants in the two regions were very similar. American plants in North America had a figure of 12.9, and European plants 14.4. Those numbers indicated differences in quality assurance systems. While the Japanese plants used a system of securing quality in the manufacturing processes, the mass production plants adopted a strategy of repairing and securing quality at the final stage of the manufacturing process.

The book used field research to demonstrate the competitive advantage of lean production over mass production. It also showed the universal character of the lean production system in terms of location. Since Japanese plants in Japan and North America achieved quite similar performances, and American plants in North America also came close, it became clear that lean production was applicable in both regions. Plant performance is not determined by an assembly plant's location. These theorists mentioned three obstacles to the diffusion of lean production: One was the resistance of western mass producers; the second outdated thinking about the world economy, following the product life cycle perspective; and the third the inward focus of Japanese lean producers, and their reluctance to carry out production overseas.

Womack and Jones provided a theory of lean thinking (Womack & Jones,

1996). Although their intent was to instruct readers on the adoption of lean production at existing mass production companies, I am interested in the principles of lean production systems which they proposed. They wrote that Henry Ford simply discovered the special case of flow production, and that Taiichi Ohno developed the general case by introducing small-lot production and quick tool changeovers. Ohno developed continuous flow production, abandoning batch production and queues. Womack and Jones made a distinction between principles and techniques, and proposed five principles for lean thinking. The first was to specify values for specific products from the customer's point of view. The value embodied in product is only meaningful when it meets the customer's needs at a specific price and a specific time. The second was to identify a value stream, which is the set of all actions needed to bring a specific product through the three business management tasks: design and engineering of the product, information management of the task of order-taking and delivery, and production, a task of physical transformation. By identifying the value stream for each product, one can divide activities into three types: those which create value, those which create no value but are currently unavoidable, and those which create no value and are immediately avoidable. The third is to put the value-creating steps into a flow. Their claim was that one needed to not use intuitive thinking with regard to production, group activities within departments or functions, and to work toward performing activities in batches. The purpose is to make flows of value-creating activities for specific product by redefining the work of functions, departments and firms. The fourth was to allow the customer to pull the product. Lean production makes exactly what the customer wants just when the customer wants it. It means one no longer uses sales forecasts, instead making what is actually needed. Finally, perfection arrives. It relates to continuous improvement. The four principles interact with each other. Putting value into a flow exposes hidden wastes in the value stream. Implementing pull system reveals impediments to flow. The elimination of waste sometimes require new process technologies and new product concepts. By defining the principles, Womack and Jones presented new concepts for lean enterprises implementing lean principles (Womack & Jones, 1996: 15-98).

Liker exemplified the applicability of lean production not only to the automobile industry but also to other industries, presenting ample case studies. I am very interested in the story of Ford Motors, which implemented lean production under the name of the Ford Production System (Liker, 1998).

4. The Hybridization Perspective

Lean production spread to foreign countries by way of Japanese multinationals, indigenous firms' adoption of the system, and the activities of consultants. Various studies have focused on the international transfer of the system. One issue is the transferability of the system itself; what parts are transferred, and how. This issue relates to the convergence or divergence of the production system. Another issue is the transformation of traditional work organization and labor relations with the introduction of lean production. Although no objections or critiques have emerged regarding the adoption of techniques such as JIT and TQC, there have been sharp difference on points of view regarding both work organization and labor relations. It

seems that there is a subtle difference on those points between American and European researchers. American researchers tend to see the transferability of the system in positive terms, and to point to various forms of adoption at different regions and firms. In other wards, they see diversity within a convergence into lean production (Kochan et al, 1997). On the other hand, European researchers tend to focus on the selectivity of introduction, or hybridization, based on trajectories of the firm (Elgar & Smith, 1995, Boyer et al, 1998). Even in the Japanization debate, the term has been used as a metaphor (Oliver & Wilkinson, 1992). In addition, there have been differences on the second point, namely work organization and labor relations. There have been both positive and negative evaluations in the U. S. Positive evaluations of the Japanese system in the U. S. have focused on the difference with traditional Taylorism (Kenney & Florida, 1993, Adler, 1993a, b, MacDuffie, 1992, 1995, Pil & MacDuffie, 1997). On the other hand, many researchers and participants in the labor movement have criticized the system, and look to the possibility of clear class confrontation (Parker & Slaughter, 1988, Fucini & Fucini, 1990, Babson, 1995, Graham, 1995, Besser, 1996, Rinehart et al., 1997). In Europe, there have been voluminous researches consisting of critiques or skeptical views of the Japanese system.

Although the Japanese system is recognized as having advantages in terms of productivity and quality of products compared to mass production, its transfer into developed countries has met with obstacles. It requires a transformation of the existing work organization and labor relations. Generally speaking, innovation is welcomed in the U. S., though it is not easy to change work organization and labor relations. Also, American manufacturing firms have tended to choose either vertical integration or pure market transactions for the procurements of parts and materials. It seems that it has been difficult to change such integrated systems into long-term transactions between assemblers and parts makers. In fact, according to a study on the adoption of the system by the big three automakers in the 1990s, they have caught up to Japanese makers in terms of reductions in lead time of product development and implemented design-in by parts makers (Dyer, 1996), they have not been able to build reliable relationships with parts makers (Helper & Sako, 1995). Also the big three have lagged behind in the area of transformation of work organization at existing plants (MacDuffie & Pil, 1997).

Kenney & Florida labeled the Japanese system "Innovation-mediated Production" (Kenney & Florida, 1993). They began their research on the Honda of America Manufacturing plant at Marysville, Ohio, and extended it to the overall question of the diffusion of the Japanese production system in the U. S. In contrast to the mass production system, which makes a distinction between mental and manual work and thus wastes worker's knowledge, the Japanese production system makes use of worker's experience and knowledge. Therefore it is conducive to innovation. Kenney & Florida found the core of the system to be the production team, in which work roles overlap and tasks are assigned to member workers and then reallocated among members. Teams are the basic mechanism for moving decision-making down to the shop floor and solving production problems. It transforms the extraction of intellectual (and manual) labor into a social, collective process. Accordingly, it makes it possible to harness workers' knowledge as a source of value at the point of production. They call these teams "self-managing work teams." Also, Japanese managers and engineers have constant contact with the shop floor. The social distances

between managers and workers are narrow. As a result, firms are able to create large stocks of knowledge within the work forces.

According to their field research on Japanese affiliated plants, aimed at answering questions about the transferability and generalizability of the model, automotive plants had successfully transferred their system to the U. S. By comparison, the experiences of TV assembly plants have been mixed. Kenney suggests that TV transplants were built before Japanese managers became confident of their ability to transfer the system (Kenney, 1999). Therefore, Kenney & Florida's answer to the question of transferability of the system was affirmative, but not unequivocal.

MacDuffie and Pil also focused on the work organization, saying that the lean production has four specific features, all different from mass production: (1) general resources, such as general purpose machines and multi-skilled workers, (2) small buffers and lot sizes in plant operation, (3) decentralized authority, and (4) integration of conceptual activity with execution of production tasks (MacDuffie & Pil, 1997: 11). They call the work organization under lean production "High-Involvement Work Practices" and emphasize five work practice: (1) on-line work teams, (2) off-line small group activities or problem-solving groups, (3) job rotation, (4) suggestion programs, and (5) the decentralization of quality control efforts. They concluded that the high performance rate is achieved through the implementation of such work practices, combined with corresponding human resource management policies to support it.

They compared automobile manufacturing plants located in the USA, Europe, Japan, Korea, and South Africa, assessing the adoption of high-involvement work practices as well as related human resources management policies. They concluded that it is possible to see a trend of convergence toward the adoption of such work practices across regions. On the other hand, they found a divergence in the adoption of the practices across and within companies. The factors which affected the diffusion and divergence of lean production were increased international competition, manager's choices, labor union's choices, and government policy. They identified four distinct groups: stable and lean (Japanese-owned plants), rapid movement to lean (European and new-entrant plants), adherence to traditions (U. S. -owned plants in North America), and hybrids (assorted plants from various countries).

Adler analyzed work organization at Japanese-affiliated automotive plants, from the viewpoint of organizational learning (Adler, 1993a, 1993b). His contribution was to clarify the fact that workers on the shop floor create work standards by themselves, and he presented a new assessment of Taylorism and bureaucracy by proposing the term "Democratic Taylorism," and "Enabling Bureaucracy." He focused his attention on the production system, and particularly the work organization, at NUMMI, a joint venture of GM and Toyota Motor, and discovered important facts through interviews with the employees. None said they wanted to go back to the GM-Fremont days. Even critics associated with the People's Caucus, who are mainly dissidents who oppose harmonious labor relations, were generally in favor of the system. Workers were participating in defining the work standards by analyzing everyday work. He listed distinctions in terms of the setting of work standards between NUMMI and traditional mass production plants. Under the traditional plants, Industrial Engineers who are not close to the work make the work standard. Then the IEs take these standard to the foreman. The foreman in turn redesigns the task

to his own liking, and presents the task design to the workers. The workers, finally, perform the task. The workers cannot improve the process. On the other hand, workers make their own standards at NUMMI. This system contributes to improvements in safety, the enhancement of motivation, and high quality. He concluded that the problem of scientific management does not lie in the use of the techniques but in the way they are made. The problem is that IEs make the standard and compel the workers to follow them. Conversely, as workers at NUMMI have the best objective understanding of the best way to do the job, they can argue with management over standards. Standardized work gives workers the right to set up their own jobs. Workers thus gain power against managers.[3]

Adler proposed a new way of assessing bureaucracy based on the same field research. He defined the "enabling bureaucracy." Although NUMMI formalized bureaucratic organization, it put importance on consensus decision-making and on middle managers exercising their authority to stimulate and support improvement activities. When bureaucracy takes an enabling form, this does not harm commitment, flexibility and innovation (Adler & Borys, 1996). He then compared NUMMI with TMMK (Toyota Motor Manufacturing Kentucky) in terms of the work practices implemented, and proposed a learning effect as well as a hybrid perspective. Although both plants has similarities in the domain of work organization, individual and organizational learning, and human resource administration, TMMK showed somewhat less of a Toyota influence than NUMMI in the domain of employment relations. TMMK chose more of a union-substitution model than NUMMI. TMMK, which was constructed later than NUMMI, developed a different hybrid pattern from NUMMI. When it entered the U. S., Toyota sought ways of working with the UAW at NUMMI, and chose a proven effective union-substitution policy at TMMK. He concluded that parent companies interpret their overseas expansions as an organizational learning process and adopt different choices at the newer plants (Adler, 1999).[4]

The University of Michigan's Japan Technology Management Program studied the transfer of the Japanese management system into the USA. Liker et al., *Remade in America: Transplanting and Transforming Japanese Management Systems* (NY: Oxford, 1999), adopted the term "hybrid" as a common point of view for the transfer of the Japanese Management Systems to the U. S. They used the term "Japanese Management System" to refer to the production systems and corporate management practices found in Japanese firms. This is because successful Japanese firms do not always follow every content of the Toyota Production System, and may have broader common management systems. They proposed a layered model of Japanese management systems, composed of four aspects: shop-floor production systems, factory organization & management, corporate systems, and institutional environment. Layer one, the shop floor production system, encompasses hard technologies as well as organizational technologies (work practices, standardized work sheets, built-in quality, continuous improvements, and so forth). Layer two, factory organization and management, includes human resource practices, supplier relations, organizational culture, communication, and learning process. Layer three, the corporate system, includes the business and management system, support staff, and union structure. Finally, layer four, the institutional environment is everything outside the corporate system. This includes consumer preferences, the legal and regulatory environment, education system, and national culture and values. They hypothesize that it is easiest

to transfer shop floor production systems, somewhat more difficult to transfer the wider factory organization, and far more difficult to transfer the institutional linkages which support the corporate system.

They put forward three theoretical perspectives on hybridization in the case of the international diffusion of the Japanese management system. They saw these perspectives as complementary. The first is the innovation diffusion perspective, meaning that the transfer of management systems is similar to the diffusion of social and technical innovations. According to Rogers, who summarized studies on the diffusion of innovations, innovations are more easily diffused if they have the following features: high relative advantage, high compatibility with existing practices, low intrinsic complexity, high trialability and observability (Rogers, 1983). But the Japanese management system has three factors that make diffusion more difficult. Firstly, it is a radical departure from American manufacturing management. This radicalness is part of the advantage of the Japanese system, but it reduces its compatibility with existing practices. Secondly, the systematic character of Japanese management reduces its compatibility with existing practices, reduces trialability, and adds complexity. Finally, the tacitness of the knowledge embedded in the Japanese management systems reduces its trialability and observability. The second is a structuralist perspective. In this perspective, the role of "context" is referred to. Proponents of this perspective see four types of forces which shape the international diffusion of the system: competition among firms, the international division of labor or parent-subsidiary relations, specific societies or societal effects, and specific companies and plants. The interaction between these forces creates a complex dynamic. Thus, the transfer of the system produces hybrid patterns. The third is an emergent perspective. The transfer of the Japanese management system cannot be designed, but is emergent in the sense of an evolutionary view of the firm. Even the management system is only partly the result of planning, and is more often the result of opportunistic experimental forms of learning. It is difficult to imagine how such systems can be deliberately transferred. Given the complexity, interconnectedness, and tacitness of such systems, they are imperfect. Recipient organizations have their own understandings of the system. Interaction between senders and recipients generate new interpretations of what is being transferred, what is not being transferred, and how the transfer is progressing. Considering these factors, the process of transfer seems to be one of emergence (Liker et al., 1999: 3-35).[5]

5. Concluding Remarks

Looking back on the development of studies regarding the transfer of the Japanese system to the USA, Abernathy first put forward the Japanese model as an alternative to mass production, based on a hypothesis of de-maturity relying on the perspective of dynamic innovation. Second came the Lean Production perspective, by the International Motor Vehicle Program at MIT. Womack et al., clarified the competitive advantages of lean production over mass production, and they claimed that the system was transferable. They also formulated a theory of lean production, separated from the techniques or methods, which was useful for understanding the content of the system. Later studies went on to the hybridization perspective.

Researchers who were looking into the organizational aspects of the system focused on work organization and human resources management policy. Kenney and Florida investigated the integration of manual and mental work on the shop floor, and proposed the term "innovation-mediated production." They discovered that different hybrid patterns were seen at different automobile and electric plants. MacDuffie and Pil proposed the term "high-involvement work practices" and found a trend of convergence toward lean production in various regions as well as divergent practices at different firms and plants. Adler put great importance into having workers make work standards on the shop floor, and called this "democratic Taylorism" and "enabling bureaucracy." He wrote that enabling bureaucracy does not cut commitment and innovation. He also pointed out different forms of hybridization at two Toyota plants. Liker et al., demonstrated the transferability of the Japanese management system to the USA, and clarified that the transferred management systems were hybrid. They also attempted to formulate theoretical perspectives to analyze the hybridization of the system in environments different from that of the home country.

Notes

(1) Utterback explained the formation of innovation dynamics (Utterback, 1994).

(2) Friedman proposed reviving the American automobile industry by adopting the Japanese system. He used the term "Japanization," which is an exception in the U. S. setting (Friedman, 1983). Schonberger indicated that the Japanese production system, composed of two factors, JIT and TQC, was transferable to the U. S. (Schonberger, 1982).

(3) A few supplementary comments are needed here. Adler explained that at NUMMI the workers made the work standards directly. However, according to my research carried out in May 1996, the situation is slightly different. Japanese managers told me that production workers do not make the work standards. Both team leaders and group leaders are in charge of making the standards. However, when a new model is launched, a pilot team composed of production workers selected from the shop floor create the standard. In this case, production workers make work standards together with team leaders and group leaders. It is important for workers themselves to understand their job contents. As each worker has unique characteristics and a different body size from others, he/she might be tempted to perform the work in his/her own way. This could cause obstacles to job rotation and quality problems. Therefore, the standardization of work is needed, and is implemented through discussions within the teams. I was given nearly the same explanation by Japanese managers at other Japanese plants. There was one case which fit Adler's explanation, namely the Honda of America Manufacturing plant in Marysville, Ohio, where workers made the work standards. Managers suggested that they use pictures to make the task easier. What is important is not whether production workers make the work standard directly. When the Japanese production system is adopted, different procedure can be institutionalized. The standardization of work enhances workers' ability to learn and gives them power to control work on the shop floor.

(4) Of course, not every researcher had positive evaluations of the Japanese system. For example, Babson, Steve ed., *Lean Work: Empowerment and Exploitation in the Global Auto Industry* (Michigan: Wayne State University Press, 1995) presented sharply different views on the system: empowerment and exploitation, commitment and high intensity of work. Critics sometimes offer interesting issues.

(5) Westney presented persuasive viewpoint for understanding cross-societal organizational transfers, by proposing three general organizational perspectives. He identified them from organization-environmental relations. The three perspectives were "strategic design," "social construct," and "political perspective." He made predictions based on each perspective on the logic of transfer and hybridization. Although I found his explanations very interesting, I would like to only mention one aspect of hybridization. He looked at three drivers of hybridization: the interaction of foreign and local patterns within the organization, imperfect information, and the interaction between internal patterns and key elements of the environment. With regard to the interaction between foreign and local patterns, from the strategic design perspective, hybridization occurs because of a lack of conformity between foreign and local patterns. There are competing pulls between the parent organizational model and prevailing local models. From the social construct perspective, the transfer of systems across borders always produces something different in the new setting. Because the foreign patterns are perceived and interpreted differently than at home, hybridization is a rule. Reinterpretation leads to changes in how it actually operates. From the political perspective, the combination of foreign and local patterns constitutes a potential arena for contending interests. For example, expatriates managers find themselves facing a dilemma. They have a source of power derived from their knowledge of the parent company, but can only achieve success in their positions if local employees accept their position and agenda. Hybridization strategies give an answer to this dilemma. In this way, he proposed persuasive theoretical perspectives on hybridization (Westney, 1999).

References

Abernathy, J. William, (1978), *The Productivity Dilemma: Roadblock to Innovation in the Automobile Industry,* Baltimore: The Johns Hopkins University Press.

Abernathy, J. William and James M. Utterback (1978), "Patterns of Industrial Innovation," in *Technology Review,* June/July, pp. 40-47.

Abernathy, J. William, Kim B. Klark, and Alan M. Kantrow, (1981), "The New Industrial Competition," in *Harvard Business Review,* Sep./Oct., pp. 68-81.

————, (1984), *Industrial Renaissance: Producing a Competitive Future for America,* NY: Basic Books.

Abo, Tetsuo ed., (1994), *Hybrid Factory: The Japanese Production System in the United States,* NY: Oxford.

Adler, Paul S., (1995), "The 'Learning Bureaucracy': New United Motor Manufacturing, Inc.," in L. L. Cummings and Barry M. Staw eds., *Research in Organizational Behavior: An Annual Series of Analytical Essays and Critical Review,* Connecticut: JAI Press, Vol. 15, pp. 111-194.

————, (1993), "Time-and-Motion Regained," in *Harvard Business Review,* Jan./Feb., pp. 97-108.

————, (1999), "Hybridization: Human Resource Management at Two Toyota Transplants," in Liker et al. eds., *Remade in America: Transplanting and Transforming Japanese Management Systems,* NY: Oxford, 1999, pp. 75-116.

Adler, Paul S., and Bryan Borys, (1996), "Two types of Bureaucracy: Enabling and Coercive," in *Administrative Science Quarterly,* March, pp. 61-89.

Altshuler, Alan et al., (1984), *The Future of the Automobile: The Report of MIT's International Automobile Program,* Cambridge: The MIT Press.

Babson, Steve, (1995), *Lean Work: Empowerment and Exploitation in the Global Auto Industry,* Michigan: Wayne State University Press.

Beechler, Schon L. and Allan Bird, eds., (1999), *Japanese Multinationals Abroad: Individual and Organizational Learning,* NY: Oxford.

Besser, Terry L., (1996), *Team Toyota: Transplanting the Toyota Culture to the Camry Plant in Kentucky,* NY: State University of New York Press.

Boyer, Robert et al., (1998), *Between Imitation and Innovation: The Transfer and Hybridization of Productive Models in the International Automobile Industry,* NY: Oxford.

Campbell, Nigel and Fred Burton eds., (1994), *Japanese Multinationals: Strategies and Management in the Global Kaisha,* London: Routledge.

Dyer, Jeffrey H., (1996), "How Chrysler Created an American Keiretsu," in *Harvard Business Review,* July/August, pp. 42-56.

Elger, Tony and Chris Smith eds., (1994), *Global Japanization?: The Transnational Transformation of the Labour Process,* London: Routledge.

Florida, Richard and Martin Kenney, (1991), "Transplant Organization: The Transfer of Japanese Industrial Organization to the U. S.," in *American Sociological Review,* Vol. 56, pp. 381-398.

Friedman, David, (1983), "Beyond the Age of Ford: The Strategic Basis of the Japanese Success in Automobiles," in John Zysman and Laura Tyson eds., *American Industry in International Competition: Government Policy and Corporate Strategies,* Ithaca: Cornell, pp. 350-390.

Fucini, Joseph J. and Suzy Fucini, (1990), *Working for the Japanese: Inside Mazda's American Auto Plants,* NY: The Free Press.

Graham, Laurie, (1995), *On the Line at Subaru-Isuzu: The Japanese Model and the American Worker,* Ithaca: Cornell.

Green, William C., and Ernest J. Yanarella eds., (1996), *North American Auto Union in Crisis: Lean Production as Contested Terrain,* NY: State University of New York Press.

Helper, Susan R., and Sako Mari, (1995), "Supplier Relations in Japan and the United States: Are They Converging?," in *Sloan Management Review,* Spring, pp. 77-84.

Kenney, Martin and Richard Florida, (1993), *Beyond Mass Production: The Japanese System and Its Transfer to the U. S.,* NY: Oxford.

Klark, Kim B., and Fujimoto Takahiro, (1991), *Product Development Performance,* Boston: Harvard.

Kochan, Thomas A., Lansbury, Russell D., and John Paul MacDuffie eds., (1997), *After Lean Production: Evolving Employment Practices in the World Auto Industry,* Ithaca: Cornell.

Kogut, Bruce ed., (1993), *Country Competitiveness: Technology and the Organizing of Work,* NY: Oxford.

Krafcik, John F., (1988), "Triumph of the Lean Production System," in *Sloan Management Review,* Fall, pp. 41-52.

Liker, Jeffrey K., *Becoming Lean: Inside Stories of U. S. Manufacturers,* Portland: Productivity Press, 1998.

Liker, Jeffrey K., et al. eds, (1999), *Remade in America: Transplanting and Transforming Japanese Management Systems,* NY: Oxford.

MacDuffie, John Paul, (1992), *Beyond Mass Production: Organizational Flexibility and Manufacturing Performance in the World Auto Industry,* May.

MacDuffie, John Paul, and Frits K. Pil, (1997), "Change in Auto Industry Employment Practices: An International Overview," in Thomas A. Kochan et al. Eds., *After Lean Production,* Ithaca: Cornell, pp. 9-42.

Milkman, Ruth, (1991), *Japan's California Factories: Labor Relations and Economic Globalization.* Cal: UCLA.

Oliver, Nick and Barry Wilkinson, (1992), *The Japanization of British Industry: New Devel-*

opments in the 1990s, Oxford: Blackwell.

Pil, Frits K., and John Paul MacDuffie, (1997), "Japanese and Local Influences: Human Resource Practices and Policies of Japanese Transplants in North America," in *GERPISA Fifth International Colloquium,* Paris, 12-13-14, July.

————, (1999), "Transferring Competitive Advantage across Borders: A Study of Japanese Auto Transplants in North America," in Jeffrey Liker, K., et al., eds, *Remade in America,* NY: Oxford, pp. 39-74.

Piore Michael L., and Charles F. Sabel, (1984), *The Second Industrial Divide: Possibilities for Prosperity,* NY: Basic Books.

Prasad, S. Benjamin, ed., (1992), *Advances in International Comparative Management,* Vol. 7, Greenwich: JAI Press.

Rinehart, James et al., (1997), *Just Another Car Factory?: Lean Production and its Discontents,* Ithaca: Cornell.

Schonberger, Richard J., (1982), *Japanese Manufacturing Techniques,* NY: Free Press.

Utterback, James M., (1994), *Mastering the Dynamics of Innovation: How Companies Can Seize Opportunities in the Face of Technological Change,* Boston: Harvard.

Westney, D. Eleanor, (1999), "Organization Theory Perspective on the Cross-Border Transfer of Organizational Patterns," in Jeffrey Liker K., et al. eds., *Remade in America,* NY: Oxford, pp. 385-408.

Womack, James P., Daniel T. Jones, and Daniel Roos, eds., (1990), *The Machine That Changed the World,* NY: Rawson Associates.

Womack, James, and Daniel T. Jones, (1996), *Lean Thinking: Banish Waste and Create Wealth in Your Corporation,* NY: Simon & Schuster.