
Abstract: One of the most influential books that has been published in recent years is the MIT study *The Machine that Changed the World* by Womack, Jones and Roos (1990). The book combines detailed empirical comparisons with bold and sweeping assertions. The Japanese management system or 'lean production', Womack *et al.* argue, is not only the world's most efficient system for manufacturing cars. It is the one best way of organizing all kinds of industrial production, featuring both dramatic increases in productivity and qualitative improvements in working conditions. According to the MIT team it is predestined to become the standard global production system of the twenty-first century, and they contend: 'Lean production is a superior way for humans to make things. It provides better products in wider variety at lower cost. Equally important, it provides more challenging and fulfilling work for employees at every level, from the factory to the headquarters. It follows that the whole world should adopt lean production, and as quickly as possible' (Womack *et al.*, 1990: 225). The purpose of this article is to challenge this view of lean production as an omnipotent system and unequivocal blessing. Starting with a discussion of the industrial limits of lean production, I then turn to *the* success story of the 1980s – the dramatic expansion of Japanese auto transplants in North America. The social preconditions for this process, largely overlooked in the MIT study, are emphasized, before proceeding to an analysis of the highly ambiguous working conditions at these new plants. The transplants have attracted many American workers, but the relentless production regime has caused growing disillusionment among employees and increasing resistance from union locals, which was demonstrated by the five week strike at CAMI in September–October 1992. Finally, I discuss current developments inside Japan, where automakers face a severe recruitment crisis. In Japan, both unions and environmentalists criticize the JIT-system heralded in the MIT study, and car manufacturers have started to design plants according to new principles. For many reasons lean production will not be the end of history!

LEAN PRODUCTION – THE END OF HISTORY?

Christian Berggren

The Contradictory Views of Japanese Management

In the auto industry, Japanese manufacturing systems have been debated for at least ten years. In this long-standing debate, one aspect is most intriguing, and that is the extremely contradictory assessments of the effects of Japanese production management.

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The first time I personally encountered this polarized picture was in 1981 at a Swedish so-called Kanban-conference for industrial engineers and production managers. The conference started with a report from a three week study tour organized by a consultant firm, full of enthusiasm for Japanese efficiency and dynamism. Its glowing presentation was followed by a contribution from a general manager of Atlas Copco, an international Swedish maker of air compressors and rock-drilling equipment. For several years he had been responsible for a plant in Japan, and portrayed a grim picture of the conditions of the small supplier firms, the *sh'tauke*, and their workers. The result was widespread confusion and discomfort among the gathered engineers. Here two very contrasting views were presented. Which of them could they believe in? Personally I found the contradiction highly stimulating. Perhaps it was not so much a confusion of minds and information, but contradictions in real life?

A second example of starkly opposing views on Japan and the Toyota Production System was a 1988 seminar for Swedish auto managers in Gothenburg organized by myself and an internal Saab consultant. The Saab consultant had just returned from the start-up of Honda, Alliston in Canada. Previously he had been quite restrained when discussing Japan. In Alliston he had seen the light. Honda's new operation was a 'total new work experience, egalitarian, creative, dynamic, uniquely productive'. At the same seminar the first results of the MIT researcher John Krafcik's international assembly plant study were presented, giving further credit to the assumption of Japanese superiority. Other Saab managers had also been visiting Honda plants in North America. They had seen very different things, however: a frantic work pace, relentless attendance demands, unsafe production equipment, and heavy indoctrination in a quasi-totalitarian culture. Their report seemed to come not only from a different plant but from a different planet!

Finally I would like to contrast the perspective of the MIT book with a quotation from the president of UAW local at a Japanese transplant, whom we interviewed in November 1991,

Lean production offers a creative tension in which workers have many ways to address challenges. This creative tension involved in solving complex problems is precisely what has separated manual factory work from professional 'think' work in the age of mass production.

(Womack *et al.* 1990: 102)

They promised us a rose garden. They gave us a desert.

(Phil Keeling, UAW President at Mazda's Flat Rock plant, 1990)

One Universal Production System?

The recent international revival of interest in manufacturing, which is very much, in contrast to the post-industrial euphoria of preceding decades, is

everywhere accompanied, in Europe and in the US as well as in Australia, by a search for international ‘best practice’. That is a central theme in the report of the MIT Commission on Industrial Productivity (Dertouzos, Lester and Solow 1989), and even more so in the report commissioned by the British Department of Trade and Industry (1990), *Manufacturing into the Late 1990s*. In Australia the same perspective is evident in the report on *The Global Challenge* commissioned by the Australian Manufacturing Council (1990). This world-wide convergence is to some extent a result of the internationalization of manufacturing, resulting in a global tendency towards what organizational theorists label isomorphism. It is also a product of the rise of a ‘management’ industry of business press, management consultants and management schools, all of whom thrive on the identification of alleged best practice and exemplary organizations (Westney 1989: 284).

For nearly all participants in this intellectual crusade, ‘best practice’ is the same as Japanese practice. The authors of the *Machine that Changed the World* present an impressive documentation of the Japanese superiority – *in car production*. From this study of auto-makers they formulate the ‘best practice’ perspective in its very extreme. According to Womack *et al.* we have reached a virtual end of history in industrial organization. Lean production is not only the most efficient way of designing and making cars, it will be the *only* way of producing in *every* manufacturing field. Moreover, in this process all the conflicts and contradictions which have plagued industrial history for so long will be solved.¹ Henry Ford’s mass production revolution, it is acknowledged, was a doubled-edged sword: it ‘made mass consumption possible, while it made factory work barren’. Lean production, in contrast, means benefits for all (Womack *et al.* 1990: 278),

Lean production will supplant both mass production and the remaining outposts of craft production in all areas of industrial endeavour to become the standard global production system of the twenty-first century. That world will be a very different, and a much better, place.

This fundamentalist perspective, that there is one and only one way of organizing manufacturing, is a kind of global superprojection of Frederic Taylor’s famous dictum – the one best way of organizing work. And, as with the approach of Taylor, its gross over-simplification is very American: one best way, the Fordist one, is now superseded by a new best one, Toyota’s; one industrial hero, Henry Ford, is followed by a second one, Taichi Ohno, in a neat succession. The far-flung claims of the MIT authors can be contested on several points. I will start with a brief discussion of the overall industrial limits to lean production.

Lean Production – Still a Volume Production

The sweeping assertions of Womack, Jones and Roos are based on their belief that car manufacturing still is the premier industry, just as it was

when Sloan wrote his *My Years at General Motors* (1963). Methods that promote productivity in the auto industry will of necessity do the same in other sectors. This view is certainly open to discussion. What, for example, do capital intensive sectors, like the petrochemical or paper-making industries, or research-intensive sectors like pharmaceuticals, have to learn from the almost obsessive focus on hours per unit produced, so evident in the *Machine* book? Toyota's manufacturing system is certainly more flexible than conventional Western ways of car production, but it is still very much a *volume production*. The achievement of Toyota was to introduce small lot manufacturing into this context of volume production. As has been stressed by the Toyota consultant Shigeo Shingo (Shingo 1981: 110), 'The question in this area is not whether or not to mass produce, but whether to produce large or small batches'. The importance of volume is inadvertently acknowledged in the *Machine* book, when it attributes the poor international competitiveness of the Mexican car industry to the small scale of 'only' 25,000 cars annually per model: 'far too low even for today's lean producers to make economically' (Womack *et al.* 1990: 265). Nissan's Australian story confirms the importance of scale in auto production, whether it is lean or not. Nissan was the first Japanese manufacturer to take the Australian market seriously and had already started local assembly in 1966. Mitsubishi and Toyota followed suit. Nissan never reached sufficient volume, however. In 1990, its Australian production totalled 57,000 units; in 1991 the figure decreased to 36,000 (AIA 1992). In February 1992 Nissan's Tokyo headquarters announced that the company would pull out from Australia. The volume was too low to warrant local production. The MIT authors contend that lean production is as flexible as craft production, only much more efficient. A *Business Week* analysis of Nissan's global problem demonstrates that the real world is far more complicated. Flexibility does not come cheap, even in Japan. In order to cut costs and regain profitability Japan's number two maker attempts to reduce the number of variations per model, slow down the model-change cycle and standardize as many parts as possible across models (*Business Week*, 22 April, 1992). And Nissan's problem are not isolated. Every Japanese maker is now moving toward fewer model variations and a common use of parts (*Automotive News*, 30 March, 1992). At the same time they are revamping their production systems to make them more flexible. In short, lean production is still very much a system of large scale manufacturing. *Flexible volume production* and not the antithesis of mass production is an appropriate characterization of the Toyota production system.

The Japanese preference for high volumes and standardization as a basis for a variety of features and options is also stressed by Michael Porter (1990). His massive study *The Competitive Advantage of Nations* contains a much more compelling analysis of Japanese dynamism than is found in the MIT texts. Japanese firms are very competitive in industries such as cars,

consumer electronics, semiconductors and standardized machine tools. They have not invented any universal production or management system, however, and Porter finds them much less successful in industries demanding customization and individualized customer relations (Porter 1990: 411): ‘Japanese firms do not do well, by and large, in industries or segments involving a high degree of customization to individual buyers, narrow applications, heavy after-sale support, and small lot sizes.’

A core argument in the MIT writings, both in *The Machine* and in the subsequent PhD Thesis by J. P. MacDuffie (1991) is the juxtaposition of lean and mass production. The explicit assumption in this argument is that before the advent of the Toyota system, mass production – plus small vestiges of craft manufacturing – was the all-dominant form of industrial production. This perspective may be approximately correct in car manufacturing, but is utterly misleading as a general frame of analysis, since most industrial activities cannot be placed in either of these categories. For example, an important reason for the strength of most competitive German or Italian industries (many of them medium-sized or grouped as networks of small businesses) is related to the fact that they never adopted the American mass production pattern.

The Success – Japanese Transplants in North America

A most important basis for the universalistic claims of the MIT study is its documentation of the efficiency of the Japanese transplants in North America. These plants have proved that ‘lean production’ is not confined to the Japanese socio-cultural context, which was an earlier widespread belief. Since they are so important for the overall argument I will discuss these operations at some length. My main source is an extensive field trip to six transplants in Canada and the US in 1990.² Fifteen months later, a study group from the Swedish Metalworkers’ Union visited four of the same plants plus NUMMI. Their report is another contribution to the ‘Scandinavian perspective on lean production’. I will also draw on a number of recent American and Canadian articles and studies of the transplants.

In the 1970s the Japanese were very successful in exporting cars to North America. In the 1980s they were equally successful in exporting their production system. They erected new facilities at a furious tempo, transferring the fierce domestic competition between car producers in Japan to North America. Technically most of the new factories are virtual clones of Japanese sister plants, fully equipped with Japanese machinery, from industrial robotics to transfer presses. More importantly, the Japanese manufacturing culture is also transplanted, as is the supply strategy. In personnel management, however, there have been some important deviations from the Japanese model, which I will come back to below. Honda

Table 1 Auto Transplants in North America 1990

Company	Location	Start year	Prod 1990	Planned prod (thousands)	Planned emp. level
USA					
Honda	Marysville/ Ohio	1982	430	510	8000
Nissan	Smyrna/ Tennessee	1983	240	440	5100
NUMMI (Toyota & GM)	Fremont/ California	1984	200	300	3400
Mazda	Flat Rock/ Michigan	1987	180	240	3400
Diamond Star (Chrysler & Mitsubishi)	Normal/ Illinois	1988	150	240	2900
Toyota	Georgetown/ Kentucky	1988	220	440	5000
Subaru & Isuzu	Lafayette/ Indiana	1989	70	120	1700
Canada					
Honda	Alliston,	1988	100		
Toyota	Cambridge	1989	60		
CAMI Automotive (Suzuki & GM)	Ingersoll, Ontario	1990	50	200	2200

Source: *Business Week*, August 14, 1989, *Automotive News*, January 7, 1991

and Nissan were the first bold pioneers; now every Japanese car maker has at least one manufacturing facility in North America. The auto firms have been followed by hundreds of Japanese suppliers. Nearly all of these plants are green field sites. Only four are unionized – NUMMI, CAMI, Diamond Star and Mazda – and all of these because of links to The Big Three. Of a total of 350 supplier transplants in USA none is unionized (*Automotive News*, 28 January, 1991).

With the exception of Nissan in Tennessee the facilities are very compactly designed, concentrating press, body, paint and final assembly shops under the same roof. NUMMI, the joint venture between Toyota and GM, has been the most spectacular success. Despite a very conventional technology it quickly reached productivity levels far ahead of all the Big Three plants. By and large all transplants have performed well in terms of productivity, quality and volume increase. In 1990 their output totalled 1.7 million units. That does not mean that they are all profitable, however. In fact, several of them probably never will be. As stated above,

lean production is very much a volume production and capacity utilization is the key to profitability. This is threatened by the fierce competition in the American marketplace – in particular the competition between the transplants. In 1992, Japanese makers sold 70 different car models in the United States. As a result, their profit margins are squeezed. The situation is even worse for the supplier transplants. According to a recent analysis in *Fortune* (June 15, 1992), 60 per cent were in the red in 1992, and the situation for Japanese plants in North America will deteriorate further by the end of the 1990s. By then, the magazine predicts, only three Japanese auto transplants will remain. The other manufacturers will leave and never return. It is interesting to compare this forecast with the confident assertion by Womack, Jones and Roos that over-capacity is only a problem for old-style mass producers: ‘Today, we hear constantly that the world faces a massive over-capacity crisis . . . This is, in fact, a misnomer. The world has an acute shortage of competitive lean-production capacity and a vast glut of uncompetitive mass-production capacity. The crisis is caused by the former threatening the latter’ (Womack *et al.* 1990: 12).

Before analyzing the experience of the auto transplants in more detail, it is important to stress that they are not generally representative of Japanese manufacturing operations in the United States. In a 1989–1990 study of Japanese factories in California, the ‘leading magnet of Japanese direct investment in the U.S.’, Ruth Milkman surveyed all companies with 100 or more employees in this state. Of a total of 66 firms, she elicited responses from 50. Twenty of these were later visited. More than half of the 50 plants operated in the electronics and electrical equipment industry, many of them turnkey assembly operations. To her surprise Milkman found that these plants differed very much from the NUMMI model. Whereas the Japanese auto transplants have recruited native-born Caucasians, applying a very selective screening process (see below), the Californian plants in Milkman’s survey primarily employed low-paid and low-skilled immigrants – Mexican, Salvadorans, Thai, Vietnamese, Filipinos (blacks, however, were conspicuously few). The hiring process was very simple. To quote one interviewed manager (Milkman 1991: 54): ‘With what we pay, if they wear shoes, we’ll hire ’em.’ Basically, these plants had neither adopted lean production principles nor the Japanese form of human resource management. Employee suggestion programs were largely inactive, team structures were few and the celebrated egalitarianism of the auto transplants (no separate parking lots or dining rooms, etc.), was hard to find. Job rotation was rare and ‘most of the managers we interviewed laughed outright when we asked about just-in-time delivery and the like’ (Milkman 1992: 73). In principle most of them were committed to avoiding lay-offs. Since the labour turnover was very high, a reduction of the workforce was easy to accomplish anyway. These Japanese plants in California had only one important trait in common with auto transplants such as Nissan,

Tennessee or Toyota, Kentucky. That was their strenuous efforts to avoid union representation. From a unionist's perspective, however, this was not very different from the managerial attitudes at American-owned non-union plants.

In spite of their limited value as representatives of Japanese overseas expansion in general, the importance of the auto transplants is difficult to overstate. They have demonstrated that lean production is possible to implement in a large-scale fashion outside Japan. They have become role models, not only for American car plants in North America, but increasingly for the new European operations that are now coming on stream, for example GM's plant in Eisenach in the former East Germany, officially inaugurated in October, 1992. They certainly deserve a closer analysis, both of their productivity performance and working conditions.

Three Basic Preconditions for High Transplant Productivity

The high levels of productivity of Japan's American plants are in most studies attributed to the management system. Production control, plant design, quality assurance and approaches to problem-solving are indeed important. The high transplant efficiency cannot be explained by these factors alone, however. Three basic preconditions play an important role.

- The first is the design of the products. All transplants assemble Japanese products, engineered for easy manufacture. This is an important factor in success, but is much more difficult to measure than assembly hours per plant, and is thus easily missed. The *Machine* book is unfortunately very focused on plant productivity, and reports only one detailed manufacturability analysis, carried out by GM. According to this study the 'design factor' contributed to 41 per cent of the productivity differential between a GM and a Ford plant (Womack *et al.* 1990: 97). In 1988, product engineers at the Swedish Saab company, who selected doors from equivalent Honda and Saab models to perform comparative assembly, using the same methods and technology, found that the Honda doors could be built in a quarter of the time of the Saab doors! Arguably, a Saab 9000 ranks very low on a manufacturability scale, so these figures are hardly representative for all Western manufacturers.
- The second basic precondition is the selection and management of the suppliers. The Japanese performance in the automotive industry is impossible to understand without considering the complex production pyramids of suppliers and subcontractors, which account for 70–75 per cent of the end product value.³ In a study in 1984 of Toyota suppliers at different hierarchical levels in Aichi prefecture, I found an ambiguous web of dynamic cooperation and outright exploitation (of, for

example, female self-employed home-workers). This was before the Plaza agreement in 1985 which resulted in a very rapid appreciation of the yen. At least at the lower layers of the pyramid, exploitation still seems to be an important aspect of the relationship (Sakai 1990). However, the new ‘era of rapid product development’, which Japanese auto-makers entered in the second half of the 1980s, triggered a rapid up-grading of many first- and second-tier suppliers, both in terms of manufacturing and Research and Development capacity, making them a very sophisticated part of the Japanese auto industry cluster (Ikeda 1991). Small wonder that the transplants in North America initially chose to import critical and technologically advanced components from Japan. Pressured by the demand for increased local content they have worked hard to select reliable American suppliers. These firms are now facing the most stringent demands they have ever met. Another method to increase ‘local’ content is to complement the car assembly transplants with component transplants. A number of Japanese suppliers have responded to these calls and erected their own facilities in North America. According to the supplier specialist Shoichiro Sei (1991), this Japanese preference for their own suppliers could not be explained only, or even chiefly, by referring to price, quality and reliable deliveries. Of more fundamental importance is the ‘hidden meaning of the social relationship’ between car manufacturers and their suppliers. This relationship means that Japanese suppliers incessantly work to improve their performance and offer services which are not spelled out in the contracts. In Japan, Sei emphasizes, contracts mean almost nothing – which is the most fundamental reason why American supplier firms have had such a hard time cooperating with the Japanese.

- A third important precondition for the high transplant productivity is the *extraordinarily careful selection of the personnel*. In Toyota, Kentucky, the screening process consisted of the following steps. First, an IQ test was administered to all applicants. The poorer half was dismissed. Then manual dexterity was tested, and again people with poor scores were dismissed. Tests of ambition, initiative and creativity followed. Role playing to test group orientation and adaptability was another method employed to weed out unsuitable candidates. The process was completed with medical examinations and drug testing. The result was an aggressively achievement-oriented workforce, where workers are competing not only between groups, but also to advance their personal ambitions. The same pattern of rigorous screening was found in all the transplants.

Such a strict selection presupposes an abundance of applicants. That has been the case for all the Japanese plants. When Nissan started in Tennessee there were 100,000 applicants for 3000 jobs. When visiting

the plant in 1990 we found the working conditions rather distressing, and in Sweden it would have been difficult to get a stable workforce. In Tennessee however, that was not the problem: quite the opposite. As our taxi-driver told us: 'People could kill to get a job here'. The reason? The best-paying manufacturing jobs in the state, 14–15 dollars per hour, plus health and other benefits, which in the United States means a middle class standard of living. Other unskilled work in the state was paid 5–7 dollars an hour, with few or no benefits. As Bluestone and Harrison have demonstrated, the availability of well-paid jobs for non-professionals in the US has decreased dramatically since the 1970s. Reports in the American business press have supplied ample evidence of the eroded standard of living facing students who finish high school in the early 1990s, compared to the earnings their parents enjoyed.⁴

It is essential to stress these basic preconditions, since they are so often left out of the story. Again, this does not mean that factory management is unimportant. It is difficult to evaluate the relative contribution of the different factors, but there are some indirect measures in John Krafcik's international assembly plant comparisons. In the paint shops, manufacturability and control of complex supplier chains are of less significance than in the welding and final assembly sections. Even so, the 'paint shop productivity' of the American-owned U.S. plants lagged behind Japanese plants by 24 per cent, and the European firms lagged behind Japanese productivity by 100 per cent. Corresponding figures for the final assembly process, where all these factors are important, were considerably higher. Here U.S.-owned plants lagged behind Japanese productivity by 61 and the Europeans lagged behind the Japanese by 161 per cent. (Krafcik 1989).⁵

Job Security and Egalitarian Profile

Perhaps the most contested issue of the transplants is their working conditions. According to the MIT authors, traditional mass production deepened the dualism of industrial work, increased productivity but degraded the work content, and they ask (Womack *et al.* 1990: 100): 'Does lean production restore the satisfaction of work while raising living standards, or is it a sword even more double-edged than Ford's?' Their answer is unequivocal. Lean production makes everyone feel good. Unfortunately they do not substantiate these happy claims with any empirical evidence. My answer is different. Lean production is indeed a double-edged sword and working conditions are deeply contradictory. This is succinctly demonstrated in the experience of the transplants.

On *the positive side* it is possible to list:

- (1) Transplants offer more job security to their highly-selected workforce

than American-owned plants do. An important test of this occurred in 1988 when Nissan suffered from poor sales and large stocks of finished cars. In contrast to the customary response among U.S. – and Swedish – companies, the Nissan management did not lay off any workers but retained all its employees until sales improved again.

(2) Their profile is much more egalitarian than traditional American plants where differences between workers and managers, white and blue collar employees, are conspicuous. ‘*We hated those ties*’ a Mazda engineer we met in Flat Rock told us, when describing her feelings towards management at the Ford plant where she formerly worked. Workers have to work hard at the transplants, but that is even more true for managers. Egalitarianism is, however, no indigenous feature of Japanese companies. In Japan hierarchical status is very important and individualized competitive evaluation of all employees by means of the *satei* system has been a vital aspect of the personnel policy since the late 1960s. In this respect the Japanese plants in North America are not transplants, but have made an important invention of their own. The egalitarian profile of these factories has amazed Japanese researchers. The explanation put forward by Endo (1991a) is the presence of the UAW in the United States, and he argues that UAW has also influenced the policies of non-union plants. However, in Kentucky Toyota plans to gradually introduce a personal assessment system, thus making it a much more orthodox application of Japanese human resource management.

(3) The quality of the products is a central issue and many employees are justly proud of the achievements of their workplace. That was seldom the case when they worked for American companies. This new culture of ‘working with pride’ seems to encompass also workers who are otherwise critical of many aspects of the Japanese system, such as the high line speed and the unrelenting performance pressure.⁶

(4) Those who pass the exhaustive screening process feel proud of belonging to the selected. The book *Working for the Japanese* (Fucini 1990) reports that according to the employees the high quality of the workforce was the most positive feature of the Mazda plant. The heavy emphasis on team-based problem-solving in the screening process is a social advantage in everyday work. The transplants have also raised the calibre of management considerably. That did not fail to impress the former GM workers at NUMMI and contributed to their acceptance of the new system.

(5) At the transplants, production and problem-solving on the shop floor have top priority. Problems in production involve the entire organization and everybody is supposed to contribute to their solution. At its best, Japanese management has a very methodical and systematic approach to discover defects and problems, to encourage suggestions, to implement

countermeasures and to evaluate the results. This capacity has led Paul Adler to coin the term 'learning bureaucracy' for the Toyota/NUMMI organization and he goes on to emphasize that the 'intensely bureaucratic, formalized and proceduralized work process' of the NUMMI system served 'the purpose of organizational learning. Standardized work, for example, captured learning by codifying best practice and workers were encouraged to constantly improve on this best practice' (Adler 1991: 58-59).

In MacDuffie's work, problem-solving on the shop floor plays a central theoretical role, and he has a lengthy discussion of the integration of conception and execution, of production and innovation, and of the alleged holistic division of labour, which is supposed to characterize the transplants (MacDuffie 1991: 57,61,75). He also conducted a field study of problem-solving activities in relation to recurrent quality issues at a GM, a Ford and a Honda plant. The Ford and GM studies are rigorous and highly critical. The Honda study, alas, is rather elusive and selective. At the American plants the problems in the relation between design department and manufacturing is a central point of analysis. In the Honda study, this relation is not even mentioned. For good reason – the plant had basically no input in the design activities. Nevertheless, Honda as well as several other transplants have put impressive employee suggestion programs in place. A key element is management attention and feedback. According to reports in *Automotive News* (27 April, 1992), Honda's CEO tours the plants every other month to discuss accepted ideas. When feasible, workers are paid overtime to implement the suggestions themselves. At the Kentucky plant, too, management support for employee suggestions is salient. Top managers are reportedly discussing bigger ideas with the workers who suggested the proposals every month. In 1991, this plant implemented more than 20,000 employee suggestions, totalling six ideas per employee. At Ford North America, the figures are reversed (six employees per idea). CAMI, the GM-Suzuki joint-venture is the leader of the pack. In 1990 its 2200 workers submitted 100,000 suggestions, and according to management the plant had started to implement 95,000 of these ideas within half a year.

Management attention and elaborate remuneration systems, that stimulate many small ideas rather than a few big ones, are not the only reasons for these staggering levels. Most of the plants are new, and have many kinks to sort out, and workers are highly selected. Furthermore, in the Toyota system of standardized work, an individual employee is not entitled to change anything by him/herself. In a less strictly controlled system, workers alter the location of materials or re-sequence various operations without informing management. Under the Toyota system they have to submit a formal suggestion before considering any change. That is a significant factor in driving up the numbers.

Lean Production – and Mean

Thus the manufacturing culture of the transplants has several qualities that are attractive to American auto workers. Unfortunately there is another side of the sword too: the unlimited performance demands, the long working hours and requirements to work overtime on short notice, the recurrent health and safety complaints, and the rigorous factory regime that constitutes a new and very strict regime of subordination.

Relentless performance demands

Transplants do not recognize any union regulation of performance demands or other limitations on management's discretion to organize work. Using the *kaizen* technique all slack is eliminated. In the GM car factories that we visited in 1990, the work pace was relatively relaxed. That was the case even at plants, like Buick City, that had achieved high productivity and quality. People had time to talk to visitors and do some reading at their work stations. These things are unthinkable at Japanese transplants. According to the Japanese view, if workers are occasionally able to read a magazine at work, that does not only signify waste (*muda*), but also that workers will lack the motive force to continually make proposals for improvements. The study group from the Swedish Metalworkers summarized their visit to Toyota's Kentucky plant in 1992 by the observation that no one seemed to be idle for one single moment, everybody was working or walking.

Richard Wokutch, author of *Worker Protection, Japanese Style* made a similar reflection when he visited Mazda in Japan: 'Production workers devote their complete attention and tremendous energy to their jobs. There is no horseplay; indeed, workers rarely smile or even talk to one another except about work-related matters. When the line stops for some reason, workers immediately begin cleaning around their work stations, performing maintenance on their tools and equipment or engaging in other work-related activities.' An American trainee sent to the same plant to prepare the start-up of Mazda's operation in Flat Rock observed: 'These people when they go to work they're there to do their job. They don't hardly talk. The little guy that I was working with, I had to almost break his neck to make him say "hi" to me because he's so busy concentrating on his job' (Wokutch 1992: 134,167).

Unlimited Working Hours

In a fundamental sense, lean production is not free of buffers. Long and flexible working hours are the hidden buffer that is utilized if necessary.

The amount of overtime work, often ordered on very short notice, was high in all transplants. The far-reaching management discretion to determine working hours means that, in principle, production quotas will be reached irrespective of what happened during the day or on the shift. This is also an instrument to force the pace of improvements in production. If interruptions require that workers must stay past normal working hours, employees' interest in preventing the recurrence of such interruptions increases. The eight-hour day, a goal for more than a century in the West, is hard to fit into the logic of lean production. 'Toyota expects its employees to be totally committed' observed the Swedish Metalworkers when they visited the Kentucky plant: 'Family, children, etc. should preferably be taken care of by someone else. One example is the way overtime is ordered. Ninety minutes before the end of the shift every employee is told by a big display if s/he has to work overtime and if so, for how long' (Swedish Metalworkers 1992: 60).

In Japan the absolute priority of production is facilitated by the gender division of labour. Regular auto workers are men and their wives take the sole responsibility for the family. Even so the auto workers union, JAW, has become increasingly critical of the long working hours. On average Japanese auto workers work more than 400 hours overtime a year, yielding a typical work-year of 2,300 hours. According to statistics presented by Koshi Endo, the total working time, including 'voluntary' activities such as QC meetings and 'hidden' (non-reported) overtime, is even longer, and often exceeds 2400 hours, fifty per cent more than the normal German work-year (Endo 1991b).

In the US a much larger proportion of women than in Japan are regular workers. At Mazda, for example, female workers made up more than 30 per cent of the workforce. The relentless demand to fulfil production quotas creates even more stress than in Japan. When women work so much overtime, who takes care of the family and the children?

Working with Pain

Japanese plants place considerable emphasis on safety and the avoidance of accidents that can interrupt production. The products are designed for easy manufacture, and great precision characterizes the making of parts. Nevertheless, the sheer repetitiveness of the fragmented jobs, combined with the intense pace and long working hours, lead to significant health risks, above all cumulative trauma disorders (CTD) or repetitive strain injuries (RSI). Incidentally these are not recognized as an occupational injury in Japan. As Wokutch has observed, it is very difficult to discuss the correlation between line speed and health hazards in Japan: 'Most Japanese workers and managers are not willing to talk about the safety and health implications of the work pace for fear of sounding as though they are criticizing the

Japanese work ethic. Complaining would entail a loss of face' (Wokutch 1992: 73).

At Mazda in Flat Rock, there were early reports of an unusually high incidence of the carpal tunnel syndrome, damage to the nerves and tendons in the hands and wrists. In 1989, the total number of work-related injuries was three times higher at Mazda than at comparable American plants (*Detroit Free Press*, 7 July, 1990). In 1990, reports of CTD fell 38 per cent (from 95 to 60 cases), and in 1991 the incidence fell a further 14 per cent. Management attributed the reported reduction to its ergonomics program and improved tools. The union however, claimed that company-induced fear and intimidation were the real reasons for the reported decline (*Automotive News*, 9 December, 1991). At Honda in Ohio, workers were worried about the rapid line pace already in the mid-eighties. In a 1986 interview a worker summed up the situation: 'If it doesn't get you physically, it will mentally sooner or later' (Krause 1986: 44). The company was proud of never having dismissed any workers; employees wondered what job security was worth if they would not be physically able to work past forty or fifty years of age. During our visit to the engine factory in Anna in 1990, managers did not acknowledge that working conditions caused any work injuries at all; instead, they claimed it all depended on the individual: 'There are strong and weak persons. There are right and wrong attitudes.'

Mazda has taken the same approach and systematically disputed workers' compensations claims.⁷ The Detroit press has reported a number of cases when injured employees have been dismissed on the ground that there is no suitable work for them: 'Mazda worker Brian Blanton said he is a perfect example of how Mazda treats workers with disputed work-related injuries. Blanton said he injured his back on the job in 1988, had back surgery in 1989 and returned to work with doctor restrictions. "Mazda followed the restrictions for about half a day and then ordered me to do work that involved a lot of bending and lifting, which killed my back", Blanton said. "I told them I couldn't do it so they fired me for disruptive behaviour and work refusal"' (*Automotive News*, 9 December, 1991). According to critics, Nissan in Tennessee has produced several examples of the same policy: "'As soon as people are injured they have no use for them," says Hardin (a former foreman). "You take the best employee, a hard worker with a good attitude and say an elbow goes out from overwork. They'll say 'Get him the hell outta here'. It is hard for me to believe it, and I have seen it,"' (Junkerman 1987: 18).

The issue of work injuries and trauma disorders is complex. Wokutch carried out an extensive analysis of Mazda (referred to as 'Jidosha'), whereby he compared the Flat Rock plant with Mazda in Japan, with other transplants, and with American plants in the U.S. In the first set of comparisons Wokutch discovered that the illness rate and reported injury

rate were dramatically higher in Mazda's U.S. operation than in Japan. One reason for this striking difference was a massive under-reporting of non-fatal injuries in Japan. This under-reporting was indicated by the high proportion of fatalities (which are likely to be reported more accurately) to total lost-work cases in Japan, about 6.5 times higher than in the U.S. for the period 1983–87. 'Soft-tissue disorders', such as CTDs, are typically not regarded as legitimate work injuries in Japan. As an illustration, Wokutch cited an episode from Mazda in Hiroshima. When Mazda's American safety and health director visited this plant he observed a production worker wincing with pain every time he bent over at his work station. He pointed this out to his hosts but their response was only 'Oh, that's nothing' (Wokutch 1992: 192). However, Wokutch also thought that the real level of work injuries was lower in Japan than in America. This he attributed to the much greater worker compliance with rules and specifications in Japan. Worker protection in Japan has a strong behavioural orientation. Because of the obedience and strict discipline of the Japanese workforce this emphasis on correct behaviour is a successful strategy, at least in some areas.

Second, Wokutch examined the experiences of other Japanese transplants in the U.S.. Data was rather fragmentary, but there was no reason to believe that Mazda's plant was substantially out of line with other Japanese transplants (Wokutch 1992: 219). That rendered the Flat Rock operation even more important.

Third, the injuries at Flat Rock in 1988–1989 were analyzed from the perspective of comparable American-owned auto plants. Although Mazda performed relatively well on the dimension of lost workdays, its rates for total injuries and illnesses were far higher than the rates for U.S. auto plants. After a careful sifting of the evidence Wokutch summarized the results in the following way: 'The obvious conclusion is that the stresses of the production system do indeed make soft-tissue disorders more of a problem at Jidosha USA. The problem seems to go to the very core of the production system, which elicits maximum efficiency from both workers and machinery. Although accidents must be avoided at all costs in this production system, slow-developing conditions such as CTDs are evidently viewed as less of a threat' (Wokutch 1992: 195).

A Rigorous Factory Regime

By eliminating buffers, lean production increases management's dependence on employees and their contribution. In the *Machine* book the MIT authors represent 'trust and feelings of reciprocity' as the basis of the system. The elimination of traditional safety nets (buffers, etc) is, however, more than compensated for by the strict personnel selection and the new regime of subordination. Uniforms are compulsory, conduct and discipline codes are spelled out in detail, demands for attendance are absolute, the

workplace is minutely regulated and all personal attributes are prohibited. In many respects the transplants involve a militarization of the factory regime. In a society plagued by disorder and delinquency this could be attractive for some employees – but it is far from the democratic quality associated with team-work in Western Europe.

The pressure this regime imposes on workers was demonstrated by events in Flat Rock in 1991. As a part of the new contract (see below) Mazda was forced to relax its perfect attendance policy. Workers were provided with four Paid Absence Allowance (PAA) days, which they could use at their own discretion simply by notifying their supervisor a few hours in advance. Despite the alleged ‘trust and feelings of reciprocity’, this new right very quickly became a kind of safety valve for many workers. As a result, production came to a stop on Fridays in some departments. To guarantee output without having to add manpower management tried to restrict the use of PAA days, especially on Fridays. In exchange the company offered substantial bonus increases. The workers voted no – the right to decide for themselves on one single issue was obviously too important to be substituted by money. Mazda then introduced the restrictions and the bonus unilaterally, but that is another story, which hardly contributed to feelings of ‘trust and reciprocity’ at the plant. It might be argued that the Mazda plant represents just bad or insensitive management, and thus cannot be construed as a case against the lean production system. An alternative explanation is that the site of the factory, in the outskirts of Detroit, is particularly unsuitable for the development of a new manufacturing culture in the auto industry. However these counter-arguments, by stressing its cultural and social contingencies, only add to the criticism of the MIT projection of ‘lean production’ as universally applicable. As a consequence both of Mazda’s financial problems and its difficulties in handling the industrial relations, Ford purchased half of the Flat Rock plant in mid 1992. Mazda Motor Manufacturing (U.S.A.) was renamed Autoalliance International Inc., and Ford acquired control of the plant’s human resource management.

The contradictory character of work experience at the transplants is borne out by a study of the Canadian CAMI plant, the joint venture between GM and Suzuki. Here a group of researchers and unionists, ‘The Canadian Auto Workers Research Group on CAMI’, has launched a longitudinal research program, consisting of field studies twice a year during a two year period. The first intervention took place in March 1990, the second in November the same year, when the plant had reached the stage of full production for one of its product lines. These two first field studies were reported to an international colloquium in Quebec in 1991 (Huxley, Wareham *et al*; 1991). On the one hand, the researchers found a consistently high level of participation in suggestion activities (71 per cent of the respondents in the second study) and a majority of workers

supporting QC activities. On the other hand there was a deeply ambiguous assessment of the team concept. Workers appreciated its social qualities, but they also thought teams were a way to get people to pressure one another. The proportion of workers viewing teams in this negative way increased from 19 per cent in the first field study to 41 per cent eight months later. Also in the second round of observation, the research team discerned a growing overall disillusionment with CAMI philosophy. Of the interviewed workers 78 per cent argued that CAMI was a factory where management still had all the power. This widespread resentment forms an important backdrop to the strike at CAMI in September–October 1992, which is discussed below.

Unions – Increasing Disillusion

In their study of Nissan's essentially non-union plant in the UK, Garrahan and Stewart point out that the new factory regime is not simply imposed by management but is actively maintained by employees themselves. They pose the question: 'What is the system of legitimacy that allows people not just to be pushed to and beyond the limit, but actually to take responsibility for the failures of the system?' An important part of the answer seems to be Nissan's elaborate 'participative' practices, where 'workers implicate themselves by participation in discipline. In fact, by disciplining others when pointing out faults, they discipline themselves. In such a way, a whole system of self-subordination begins to develop' (Garrahan and Stewart 1992: 116, 138). To prevail, such a system is highly dependent upon the presence of a well-diffused company consciousness and, by the same token, an absence of independent trade unionism that could provide an alternative, collectivist, interpretation of production problems and worker experiences.

These observations make it particularly interesting to study the development at the unionized transplants in America. At the start, all union locals adopted a very cooperative policy. They represented a highly-selected workforce, proud to be there and anxious not to jeopardize their well-paying jobs. The careful screening procedure certainly did not favour union militants, anyway. Moreover, at the national level, UAW viewed far-reaching cooperation with the Japanese as vital to get access to the new breed of plants, and argued very strongly against any revival of adversarial attitudes. The labour-management collaboration and teamwork at NUMMI was heralded by Solidarity House as the future, and an embodiment of central union aspirations. And yet, with increasing experience, resistance and criticism of the new production methods seems to be growing in all union locals.

Last year, when we were negotiating the first contract, people told us not to be intransigent. The main thing was the jobs and the employment security. They

wanted to believe in the company, just as we did. Today the attitude is altogether different. People do not trust the company any more, even if they tell the truth. (Don Shelby, President of UAW Local 2488, Diamond Star, November 1990)

Many of us came to CAMI naive as to how a plant functions, and had no reason to question the CAMI plant system. We all wanted CAMI to be the employment Utopia described by the employee handbooks . . . When I became Vice-President the previous winter I did so because I didn't want a bunch of Union hot-heads running the Local, doing nothing but running management down and bad mouthing everything we had worked so hard to establish as 'The CAMI Way'. In the interim, I experienced and heard about as much reality as I could take, until I realized what a smokescreen it all was. I became exactly what I had hoped to protect this Local and this Company from.

(Rob Pelletier, President of Local 88, CAMI, in *Off the Line*, 5/1990.)

Union Politics at Mazda

The development of industrial relations at Mazda, Flat Rock has been extensively documented in the work of Fucini (1990). The plant started with a very cooperative, not to say acquiescent, union leadership which was put in place by the UAW region. As result of rapidly-growing worker resentment against the new management methods, these UAW-appointees were ousted in the first local elections and replaced by a more militant leadership. At the time of our visit (November 1990) the new president had recently been re-elected and was furiously preparing the negotiations of the new contract. Some time later, 90 per cent of the workers voted to give this leadership the right to call a strike if negotiations stalled. The new Mazda contract was finalized in March 1991 and constitutes the first case where a union, relying on strong membership support, was able to influence and modify the 'lean principles'. As such it was an important reference point in the 1992 contract negotiations at Diamond Star and CAMI, the two other unionized transplants in the North Midwest (CAMI in the Canadian province Ontario is located less than 150 miles from Flat Rock). The most significant novelties of the Mazda contract were:

- More union influence in company decisions about introduction of new technology, outsourcing of work and use of outside contractors;
- Improvements of the union's position regarding health and safety, such as the establishment of a written health and safety grievance procedure, the addition of another full-time health and safety representative and a full-time ergonomics representative, a joint ergonomics training program and union access to information such as symptoms surveys, etc.
- Elimination of the Support Member Pool (temporary employees), and an agreement that temporary employees can only be used if there is mutual agreement between the union and the company about their use

and number and that they will not be used to avoid hiring regular full-time employees.

This is Detroit – but how about NUMMI? Since its inception in the middle of the 1980s, this plant has been operating in a strongly cooperative way, supported by a solid labour-management consensus. Nevertheless, within the union there has been a strong opposition criticizing the high line speed and the constant pressure to work harder and faster, not just smarter. For several years this opposition, ‘The People’s Caucus’, enjoyed a majority in the assembly department. In August 1991 the critics won the majority in local elections. It was no easy task for the new leadership to implement changes in the system, however. When the Swedish Metalworkers visited the plant in 1992 they found the work pace very demanding, the job content extremely restricted and the physical work environment deficient in a number of ways.

CAMI 1992 – The First Transplant on Strike

Of particular importance for the future of industrial relations at the transplants is the development of CAMI in 1992. Following a period of growing tension in conjunction with the new contract negotiations, the CAMI workers walked off the line on 14 September, not to return until 18 October. The Canadian workers wanted an improvement in their compensation to achieve the same wages and benefits as other unionized car workers in Canada. But more important was an increasing general distrust of management. Since early 1991, 500 grievances had been filed at the plant. Workers complained about the inequalities in the treatment of managers and workers and criticized the factory regime, for example the company prohibition against reading newspapers or listening to the radio while on break. A main issue was the vague contract language: “‘We’re going to have to go back and spell out the rules in a collective agreement,” Pellerin [the Canadian Auto Workers’ national service representative] said. “No more of this trust and cooperation business”” (*Automotive News*, 21 September, 1992). The contest ended in important union gains, not only in compensation. The new contract included a number of other provisions, such as greater union input in health and safety issues, an expanded training programme and the establishment of a replacement pool for both long and short term absences. When the results of the negotiations were presented for approval or rejection at a union meeting, 1900 members (out of a total of 2300) showed up. At this meeting, the announcement that team leaders now should be elected by the teams, and not appointed by management, was greeted by the biggest cheer. The second most popular announcement was the new language of ‘workplace dignity’, allowing personal radios during breaks and lunch and emphasizing that personal

sweaters and sweatshirts would remain the worker's option, an effective end to management's attempt to enforce uniforms.⁸

Union locals can hardly change the fundamental logic of the new production system. In view of the MIT perspective, that the lean orthodoxy must be accepted piece and parcel, lock, stock and barrel, the modifications they can effect might prove quite significant, however. Most important, the Mazda and CAMI experiences testify that participative management and a highly selective recruitment do not preclude the development of broad union consciousness and mobilization. This will call for a further adaptation of Japanese practices at these plants, and exercise increasing pressure on the nonunion transplants. When UAW in 1989 tried and failed to organize Nissan, Tennessee, management used the NUMMI experience to convince workers that paying union fees would not make any real difference. The new CAMI agreement has enhanced union credibility, and will not fail to impress employees at the so far non-organized Toyota and Honda operations in the Ontario province.

Japan: Automotive Work as 'san-kei': Hard, Dirty and Dangerous

Crucial for the future of auto work are developments in Japan. In the late 1980s the Japanese labour market became very tight, which created increasing difficulties for auto-makers in recruiting young workers. One important reason was that auto work has acquired the reputation of being 3K ('san kei'), that is Kitanai (dirty), Kitsui (hard) and Kiken (dangerous). These negative attitudes are not confined to new entrants to the labour market. According to a large survey carried out by JAW (the national federation of the unions within the auto industry), very few employees would recommend their children to get a job in the automobile industry – of all respondents 43 per cent answered no, 43 per cent found the question difficult to answer, and only 4 per cent gave a positive response. The main reasons among production workers for the reluctance to recommend the auto industry were the following: too low wages compared to the hard work, too much overtime and holiday work, too much shift and night work and too intensive work (JAW 1989: 29). These results were supported by another workplace survey published in 1991. According to this, two thirds or more of the production workers in the auto industry reported too tight manning and too much work, too much overtime and too many difficulties in utilizing paid holidays. Sixty-seven per cent were not satisfied with their working environment, 62 per cent regarded their work as excessively routine and 72 per cent did not find that the company paid enough attention to human resource development (JAW 1991: 50). These results once again demonstrate the biased and one-sided character of MIT's *Machine* book. The book has been sharply criticized by JAW on account of the authors' total neglect

of the long working hours Japanese employees are forced to work with no relief in sight. JAW also resents the short product cycles, which are seen as a drain on human and natural resources. The vaunted just-in-time-production system is widely criticized for its detrimental social effects, and has been blamed for urban congestion and pollution. For example, in 1991 a special committee to the Ministry of International Trade and Industry blamed the just-in-time system for overloading the delivery system, creating traffic problems in cities and labour problems nationwide by forcing an insufficient number of drivers to work excessive overtime (*Automotive News*, 2 September, 1991 and 25 March, 1991).

After decades of stunning productivity improvements, Japanese workers demand a better life. JAW urges the automakers to reduce overtime from the industry average of 2,300 hours to 1,800 per year, to lengthen the product cycles and reduce the number of model variations, and argues for less pressure in the workplace and less coercive demands on parts makers, dealers and transport companies (*Automotive News*, 24 February, 1992).

The car makers' recruitment problem is not a transient phenomenon, which will disappear in a time of slower economic growth. According to labour market economist Haruo Shimada, Japan is experiencing a profound demographic change, and there is a long-term shrinkage of the younger end of the labour force. Further, there is a structural change in Japanese values. Affluent and highly educated youngsters increasingly shun dirty and repetitive jobs. As Shimada emphasizes: 'Postwar Japan's rapid economic growth was sustained by the availability of large numbers of young workers who wanted to work and were willing to work for rather low wages' (Shimada 1991: 9). In the 1990s companies will have to accommodate a very different situation. Initially Japanese automakers responded to this pressure in two principal ways – by stepping up their international expansion, and by sharply increasing their investments in automation, seeking a technological solution to the labour problem. The traditional Toyota model of low cost rationalization based on continuous shop floor improvements which is at the heart of the NUMMI success tends to be superseded by a more divided work organization, allowing for a much stronger emphasis on professional specialists, for example permanent and specialist kaizen teams.⁹ When capital costs started to soar in the early 1990s this technological strategy became much less feasible. Leading auto executives acknowledged that the development of automation had come to a turning point, and could not be the sole answer to the problems (*Automotive News*, 30 March, 1992).

Already in 1982 the Toyota union had started to demand improvements in the working conditions in the company's assembly plants. They had to wait until 1989 before a process of real change started. Then Toyota began experimenting with so called 'ideal Kumis' (workshops), where the line design was modified in order to achieve a more even workload and new

systems of skill formation were launched. In 1991 Toyota opened a new Tahara plant, which is regarded as a pilot factory for the development of a new assembly concept. The motto of the plant is ‘factory friendly to the worker’. The degree of automation is high, work shops are spacious and buffers are used to make production more flexible and to improve working conditions. According to Nomura (1992: 12) the heralded ‘zero stock philosophy’ has been revised, and in the new plant a certain kind of *muda* (waste) is regarded as necessary to alleviate the rigours of assembly work.

Nissan has embarked on the same route. Its new Kyushu plant came on stream in May 1992, and has been presented as a ‘dream factory’ (*Automotive News*, 13 July, 1992). The conveyor belt is eliminated and each car sits on its own dolly, which can be raised and lowered at every work station to create an optimal working position. The plant is air-conditioned, spacious, and has a low noise level. In many respects it seems to be similar to Volvo’s Swedish Kalmar plant – although, as at Kalmar, work is still demanding and bound by the clock. Nevertheless this plant, as well as Toyota’s Tahara operation and Mazda’s new, highly automated Hofu plant, signify a novel direction in the Japanese automobile industry. All these new facilities address the same two problems – to increase flexibility in order to cope with the increasingly fragmented market, and to create attractive work places, that could safeguard a high worker commitment in the future.

‘Lean production’ is certainly not the ultimate station of industrial development. Fortunately, history seems both able and keen to provide us with new surprises.

Notes

1. In a study of Nissan’s operation in Sunderland, UK, Philip Garrahan and Paul Stewart (1992) have taken on this brave new world theme, so salient in the post-Fordist discourse. By concentrating on the regime of subordination they thoroughly debunk the notion of employee empowerment in lean production and highlight the ‘sublimation’ of class conflict into peer competition and intergroup rivalry. This aspect of the new management system is of vital importance, but will not be pursued in this article.
2. This study was conducted with two other researchers from the Swedish Royal Institute of Technology, Ernst Hollander and Torsten Björkman. For a full report, see Berggren, Björkman and Hollander (1991).
3. A comprehensive analysis of the various strata of these pyramids is provided by Smitka (1990).
4. See for example ‘What Happened to the American Dream?’, *Business Week*, 19 August, 1991. This article portrays a couple, Troy and Linda, both working in the service sector. Together they earned 44 per cent less, adjusted for inflation, than Troy’s father alone earned as a bluecollar worker of the same age.

5. According to the same study, a Japanese plant spent 1.6 hours/car in the paint shop and 5.0 hours/car in the assembly area. A roughly equivalent German plant spent 9.4 hours/car in the paint shop and 25+ hours/car in the assembly area.
6. Lowell Turner provides some very interesting examples from NUMMI, where members of the oppositional 'People's Caucus' spoke proudly of their high quality performance, and eagerly promoted the products from the factory (Turner 1989: 22–23).
7. Several early cases were reported in *Automotive News*, 13 February, 1989.
8. Dave Robertson, CAW Headquarters Toronto (personal communication, 10 October, 1992).
9. This tendency was reported by several Japanese specialists at the symposium 'Production Strategies and Industrial Relations in the Process of Internationalization', Sendai, Japan, 14–16 October 1991.

References

- Adler, P. (1991) *'The 'learning bureaucracy': New United Motor Manufacturing, Inc.'* Draft. School of Business Administration, Univ. of Southern California forthcoming in B.M. Staw and L.L. Cummings (eds.) *Research in Organizational Behavior*, Greenwich, CT: JAI Press.
- Automotive Industry Authority (AIA) 1992, *Report on the State of the Automotive Industry 1991*, Canberra: Australian Government Publishing Service.
- Automotive News* 1989–1992:
- 13 February, 1989. 'Injury, Training Woes hit new Mazda Plant'.
- 28 January, 1991. 'UAW loses 3rd attempt to organize'.
- 25 March, 1991. 'Just-in-time deliveries clog Japanese highways'.
- 2 September, 1991. 'Fast-paced Japanese hit the expansion redline'.
- 9 December, 1991. 'Mazda, workers disagree on reasons for drop in injuries'.
- 24 February, 1992. 'Makers vow to cut hours of Japan workers'.
- 30 March, 1992. 'Debt leaves makers almost broke'.
- 27 April, 1992. 'Plant floor is fertile soil for ideas'.
- 13 July, 1992. 'Factory Fantasia. New plants address Japan's reality – few workers many models'.
- 21 September, 1992. 'CAMI strike wilts transplant rose'.
- Australian Manufacturing Council (1990) *The Global Challenge*, Melbourne.
- Berggren, C., Björkman, T. and Hollander, E. (1991) *Are they unbeatable? Report from a field trip to study transplants*. Stockholm: Dept. of Work Science, Royal Institute of Technology & Sydney: Centre for Corporate Change, Australian Graduate School of Management.
- Bluestone, B. and Harrison, B. (1989) *The Great U-turn*, New York: Basic Books.
- British Department of Trade and Industry/PA Consulting Group (1989) *Manufacturing into the Late 1990s*, London.
- Business Week* 1989–1992:
- 14 August, 1989. 'Shaking up Detroit'.
- 19 August, 1991. 'What Happened to the American Dream?'
- 22 April, 1992. 'Will Nissan get it right this time?'
- Dertouzos, M.L., Lester, R.K., Solow, R.M. and the MIT Commission on Industrial Productivity (1989) *Made in America: Regaining the Productive Edge*, New York: Harper Perennial.

- Detroit Free Press*, 7 July, 1990. 'Danger rises in new auto jobs'.
- Endo, K. (1991a) 'Satei (*Personal Assessment*) and inter-worker competition in Japanese firms'. Paper presented at the symposium Production Strategies and Industrial Relations in the Process of Internationalization, Sendai 14–16 October 1991.
- Endo, K. (1991b) *Working hours in Japan*, Yamagata: Dept. of Economics, Yamagata University. Mimeo.
- Fortune*, 15 June, 1992. 'How Japan got burned in the U.S.A.'.
- Fucini, J. and S. (1990) *Working for the Japanese*, New York: The Free Press.
- Garrahan, P. and Stewart, P. (1992) *The Nissan Enigma*, London: Mansell Publishing Ltd.
- Huxley, Wareham et al. (1991) *Team Concept: A case study of Japanese production management in a unionized Canadian auto plant*. Paper presented at the Université Laval in Quebec, August 1991.
- Ikeda, M. (1991) *Development network in the automobile industry – new developments*. Paper presented at the symposium 'Production Strategies and Industrial Relations in the Process of Internationalization', Sendai 14–16 October 1991.
- JAW, Confederation of Japanese Automobile Workers' Unions (1989), *Report on consciousness of union members* (in Japanese), Tokyo. Mimeo.
- JAW (1991) 'Report on the seventh survey of consciousness of union members' (in Japanese), *Rodo Chosa (Labour Research)*, June, 32–70.
- Junkerman, J. (1987) 'Nissan, Tennessee', *The Progressive*, Vol. 51: 6, 16–20.
- Krafcik, J. (1989) *Explaining High Performance Manufacturing: The International Automotive Assembly Plant Study*, Houston: Competitive Manufacturing Research. Mimeo.
- Krause, K. (1986) 'Americans can build good cars', *Washington Monthly*, July–August, 41–46.
- MacDuffie, J. (1991) *Beyond Mass Production. Flexible Production Systems and Manufacturing Performance in the World Auto Industry*. PhD Thesis submitted at MIT/Sloan School of Management, February 1991.
- Milkman, R. (1991) *Japan's California Factories – Labor Relations and Economic Globalization*, Los Angeles: Institute of Industrial Relations, University of California.
- Nomura, M. (1992) *Farewell to Toyotism? Recent Trend of a Japanese Automobile Company*, Okayama: Dept of Economics, Okayama University. Mimeo.
- Porter, M. (1990) *The Competitive Advantage of Nations*, London: MacMillan.
- Smitka, M. (1991) *Competitive Ties: Subcontracting in the Japanese Automobile Industry*, New York: Columbia University Press.
- Sakai, K. (1990) 'The feudal world of Japanese Manufacturing', *Harvard Business Review*, Nov–Dec, 38–49.
- Sei, S. (1991) 'Is technical innovation all? A hidden meaning of social relationships behind the product development stage in Japanese automotive industry.' Paper presented at the symposium 'Production Strategies and Industrial Relations in the Process of Internationalization', Sendai 14–16 October 1991.
- Shimada, H. (1991) 'Japan's Changing Labor Market', *Journal of Japanese Trade & Industry*, 4, 8–11.
- Shingo, S. (1981) *The Toyota Production System*, Tokyo: Japan Management Association.
- Sloan, A.P. (1963) *My Years at General Motors*, Garden City, New York: Doubleday.
- Swedish Metalworkers' Union (1992) *Japanska produktionskoncept i Nordamerika* (Japanese production concepts in North America), Stockholm.

- Turner, L. (1988) *NUMMI in Context*, Berkeley: Department of Political Science, University of California.
- Westney, E. (1989) 'Internal and external linkages in the MNC: The case of R&D subsidiaries in Japan', in C.A. Bartlett, Y. Doz and G. Hedlund (eds.) *Managing the Global Firm*, London: Routledge.
- Wokutch, R. (1992) *Worker Protection, Japanese Style*, Ithaca, New York: ILR Press.
- Womack, J.P., Jones, D.T. and Roos, D. (1990) *The Machine that Changed the World*, New York: Macmillan.

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