1.
The Assembly-Line Regime and The Volvo Trajectory

Seldom have changes in the labor market and industrial work been described from such different perspectives as during the past decade. Authors such as Barry Bluestone and Bennett Harrison (1988) have shown how insecurity and low-wage work have spread to many parts of U.S. industry, how union-negotiated employment conditions have worsened on such matters as vacations and sickness pay, and how the internal labor markets of large U.S. companies have deteriorated or disappeared—in short, how the prospects of high school graduates have declined sharply since the 1960s. At the same time, Michael L. Dertouzos, Richard K. Lester, and Robert M. Solow write in the well-known MIT report on industrial productivity *Made in America* (1989:134–35): "We see an unprecedented opportunity in the new technologies for enabling workers at all levels of the firm to master their own work environment. This marks a major change from even the recent past. . . . If American industry can seize this opportunity, individuals may experience a new measure of mastery and independence in the job that could go well beyond maximizing productivity and extend to personal and professional satisfaction and well-being."

One of the most significant contributions to the optimistic "flexibility debate" focuses solely on the auto industry. *The Machine That Changed the World* (1990) is based, unlike many other works in this genre, on comprehensive empirical material and impressive comparative studies. As do many others, James P. Womack, Daniel T. Jones, and Daniel Roos claim that mass production is approaching its demise and that Japan leads the way. They maintain that Japanese auto companies have blessed the world with a completely new approach, lean production, which "combines the best features of both craft production and mass production—the ability to reduce costs per unit and dramatically improve quality while at the same time providing an ever wider range of products and ever more

challenging work" (277). According to the authors, lean production will mean a global revolution: "Lean production will supplant both mass production and the remaining outposts of craft production in all areas of industrial endeavor to become the standard global production system of the twenty-first century. That world will be a very different and a much better place" (278). They believe the Japanese management system entails dramatic improvements in both productivity and working conditions. Unfortunately, however, they submit no evidence whatsoever for their optimistic judgments. They carefully review productivity levels, yet, when it comes to conditions of work, they content themselves with cocksure assertions.

The Persistence of the Line Regime in the "Post-Fordist Age"

In 1990, there were ten Japanese-owned auto plants in North America. The Ford Company, moreover, had made major progress in adopting lean procedures. Have these plants achieved the revolution in assembly work alleged by the MIT researchers?

It is useful to compare the auto industry of the 1980s and 1990s with that of the 1950s—the heyday of classical Fordism—when some of the most incisive and penetrating studies of the nature of auto work were done, including those by Robert Blauner (1964), E. Chinoy (1955), and Charles Walker and Robert Guest (1952). In a summary of these studies, Blauner noted a widespread discontent among auto workers in an age of rising affluence and expectations. The reasons were many:

Workers on the line had no possibility of varying the pace of their work at their own discretion but were subjected to rigid, mechanical pacing.

The work was extremely repetitive—a most objectionable feature for a majority of the workers. According to Blauner, auto workers were more likely than workers in any other industry to consider their jobs constantly dull and monotonous.

It was difficult for the workers to gain a sense of purpose by orienting their efforts to the completion of a task. This problem, Blauner emphasized, did not arise from any lack of understanding of the process as a whole: "Automobile workers have a large amount of such understanding" (99–100). The root cause of the problem was the minute division of labor and the cyclical nature of the work, as embodied in the fact that the vehicle to which the worker had added a part immediately moved onward.

The workers were subjected to intense time pressure: "The fact that there is no other industry in which such a high proportion of the unskilled complained of job pressure suggests that it is the assembly-line technology and work organization and not just the lack of skill which is crucial."

The physical demands of the assembly work were severe, in contrast to other industries in which the majority of the low-skilled and highly repetitive jobs involving little freedom and control were not physically demanding. As a consequence of the intense job pressure and physical work loads, a high proportion of the workers reported that their jobs left them feeling very tired at the end of the day.

In conclusion, Blauner emphasized the importance of the technological structure: "The assembly line's inexorable control over the pace and rhythm of work is most critical; it is largely responsible for the high degree of pressure, the inability to control the quantity of work, and the lack of free movement."

If this was the character of work in assembly plants during the 1950s, what about the 1980s and 1990s? According to the MIT authors, the advent and expansion of lean production has meant a fundamental transformation of classical mass-production work. A reading of reports from the shop floor, however, such as *End of the Line* (Feldman and Betzold 1988), which consists of a series of accounts from workers at an American lean producer (Ford Michigan Truck Plant) or *Working for the Japanese* (Fucini and Fucini 1990), with its detailed description of a Japanese transplant (Mazda at Flat Rock, Michigan), yields a radically different picture. Factory layout, production control, and quality standards have all changed, but the basic nature of the work seems to be much as it was in the 1950s.

This impression was confirmed when I and two other Swedish researchers did a study of working conditions in six North American transplants in 1990: Nissan in Tennessee, Honda in Ohio, Toyota in Kentucky, Mazda in Michigan, CAMI (GM-Suzuki) in Ontario, Canada, and Diamond Star (Mitsubishi-Chrysler) in Illinois (see Berggren, Björkman, and Hollander 1991). True, the personnel policies had changed from the "massified anonymity" and depersonalization of the 1950s toward a strong emphasis on selection and individualization. Programs such as employee involvement, pay for knowledge, and quality circles, as well as well-publicized suggestion schemes served to enhance the personal commitment of all "associates." The "atrophied group structure" of the line in the 1950s had been replaced by an elaborate "team organization," which was intended to improve on the low normative integration of classical Fordist work. And job security, always very fragile in the American auto industry, was a paramount objective.

Yet the character of the work itself has not changed. If anything, the rhythm and pace of the work on the assembly line is more inexorable under the Japanese management system than it ever was before. Off-line jobs, such as those in subassembly (the senior workers' favorite positions, in which a personal work pace and "banking" were possible) have been outsourced or are geared strictly to the main line by means of just-in-time (JIT) control. Idle time is squeezed out of each work station through the application of *kaizen* techniques, while work pressure

has been intensified and staffing drastically reduced in the name of eliminating all "waste" (*muda*). According to Blauner, auto workers resented the fact that the speed of the belt made it difficult for workers to detach themselves from the repetitive work. These difficulties have been aggravated by the combined JIT and quality pressure (zero defect) of the modern Japanized lines, which demand a high degree of mental concentration on work that is still very standardized.

Traditionally, management in American plants was strongly authoritarian ("drill sergeant style"), and labor relations were adversarial. The team organization characteristic of the lean producers emphasizes a different language and manner of communication: all employees are supposed to treat one another with respect and to work for the same goal, as good members of the "Toyota Team," the "Mazda Team," and so on. But the team concept is a far cry from democratic work organization and autonomous worker decision making. The emphasis on visibility and strict adherence to minutely prescribed standards in all tasks (exemplified by programmed worksheets and the like) restricts, even more than before, workers' discretion in the choice of work methods. Lean production may be fragile from a production control point of view, but its factory regime is rigorous with demands for perfect attendance, mandatory company uniforms, the prohibition of all personal articles, strict rules of conduct, and an elaborate system of sanctions. The MIT study argues that lean production, since it has no slack and no safety net, is based on trust and cannot operate if "the work force feels that no reciprocal obligations are in force" (Womack, Jones, and Roos 1990:103). Workers and unionists whom we interviewed during our tour of transplants in 1990 criticized precisely this absence of reciprocity. To quote the president of Local 2488 at Diamond Star: "They talk a lot about flexibility, but it's a one-way street. It's always the employees who are supposed to be flexible, never the company."

Lean production undoubtedly represents a major advance in productivity. But if one considers working conditions as well, it is a double-edged sword to at least the degree that the classical Ford system was.

The Swedish Contribution: A Different Kind of Teamwork

A very distinct assembly design and work organization developed in the Swedish auto industry during the 1970s and 1980s. The search for an approach that differed from the international mainstream was a contested process, stamped by sharp intramanagement divisions. Nevertheless, by the late 1980s, new solutions had materialized in a number of new facilities.

In the international context, the Swedish development had two distinct features. For one, the use of the assembly line—the standard production system for

nearly all auto producers—was repeatedly questioned. To obtain more flexible work structures and more attractive jobs, many alternatives were tested—from buffered flow systems with automatically guided vehicles to the complete dissolution of the assembly line by means of parallel dock assembly, in which small teams of skilled workers built complete cars or trucks. The most advanced cases represented a major change in the technical organization of production, amounting to a drastic reduction of the horizontal division of labor. Fragmented and repetitive tasks were converted to functionally coherent jobs performed on stationary objects instead of a moving line; these jobs, moreover, were characterized by long work cycles (several hours or more).

For another, the traditional shop-floor hierarchy was replaced by group work, in many cases involving considerable autonomous decision making and thus a substantial reduction in the vertical division of labor. Teamwork certainly played a central role in the Japanese management system. The Swedish model differed, however, in four important respects. First, the organizational changes were strongly linked to changes in the production arrangement, which aimed at creating conditions whereby functional groups would have some technical autonomy. The work teams at the transplants, by contrast, were organized directly on the line.

Second, the Swedish version of teamwork was marked by a desire to increase the workers' organizational autonomy and scope for independent decision making. The teams often selected their own leaders or group representatives and performed tasks that earlier had been done by foremen and industrial engineers.

Third, the role of first-line management was changed from that of having direct control to coordinating, planning, and supporting. At the transplants, by contrast, teamwork usually went hand in hand with a strengthening of the managerial structure. In many cases—Nissan in the United Kingdom or Toyota in Kentucky, for instance—the team was organized directly around the foreman. These forms of teamwork entailed a reduction of worker autonomy and an increase in managerial control.

Fourth, in Sweden, the Metal Workers' Union strongly committed itself, both centrally and locally, to the development of this new organizational form. It was especially interested in strengthening the teams' decision-making prerogatives, as well as their prospects for developing collective competence.

Table 1-1 provides an overview of the differences between the Swedish and Japanese forms of teamwork. The Japanese model of the 1980s was a coherent and systematically realized concept in which teamwork was firmly rooted in an organizational structure shaped by management. The practices and policies developed in Japan were not uniformly implemented, however, in the overseas operations of Japanese companies. The unionized transplants in North America,

for example, did not employ the elaborate personnel evaluation and wage-setting practice (*satei*) that plays such an important role in Japan. Consequently, first-line managers were considerably less powerful in the American plants.

The Swedish model was even less uniform and fixed. It represented a *social compromise* between different interests: between management's interest in delegating tasks and responsibility without yielding control and the trade union's aspirations to achieve a genuine shift in the balance of power. This meant, among other things, that the boundaries of the work teams' autonomy and decision-making power could not be deduced from some guiding concept. Rather, the boundaries were more like temporary outposts in a still-contested terrain.

Labor-intensive processes such as assembly entail a special control problem for management. A comprehensive decentralization of decision-making prerogatives from management to the work teams has considerable productive potential, but it also involves the risk that workers will make use of their increased resources to defend themselves from the demands of the economic system by restricting both their own work efforts and management's insight into the production process. This is one of the reasons work developments in the Swedish auto companies have often been hesitant and inconsistent. The Japanese model of teamwork escapes this ambiguity. Delegation of responsibility, for quality, for example, takes place within the framework of a tight regime, complete with precise visual control systems, intensive personnel selection, and a wide array of disciplinary measures. The possibility of collective worker action and of various forms of opposition and restrictions on output is thereby eliminated.

As early as 1979, Robert Cole observed important differences between developments in Swedish and Japanese companies. In Sweden, he noted, the aim was "to achieve a fundamental change in the basic structure of the organization, with rather open-ended possibilities for worker influence" (203). In Japan, "job redesign occurs in a context of unquestioned management authority" (201), with the emphasis "not on participation per se, but rather on achieving the consent of workers for policies which management wants to pursue. . . . Decentralization at Toyota Auto Body has been accompanied, if anything, by an increase in the authority and role of the foreman" (209).

Importance of the Assembly Design for Working Conditions

In Blauner's analysis, the technological structure plays a central role in determining the character of the work. The auto researchers at MIT take the opposite position: management is everything; with lean production, the same technology produces fundamentally different work. They flatly deny, without any empirical substantiation, that a different production design that expands cycle times from

TABLE 1-1. The Japanese and Swedish Models of Teamwork

Characteristic	*Japanese*	*Swedish*
Production arrangement	Trimmed lines with just-in-time control.	Sociotechnical adaptation and increased work content, most radically in complete assembly.
Relations between groups	Elimination of all buffers and variation in individual work pace.	Reduction of group interdependencies by increasing worker autonomy and allowing variations in individual work pace.
Supervision and coordination	Dense structure and strengthened role vis-à-vis both staff and subordinates. Foremen decide matters concerning training, promotion, and wages.	Reduced control (how much is a contested issue). Tasks shifted toward planning, and daily responsibility is delegated to the teams.
Administrative control	Team leader is selected by first-line management. Suggestions by the workers encouraged but decisions are taken hierarchically to ensure standardization.	Group leader/representative chosen by the team. The post is often rotated, but this is a controversial question.
Work intensity and performance demands	Intense managerial and peer pressure for maximum performance. No upper performance limits.	Performance limits are specified in contract between company and union. Actual work intensity varies, depending on the wage system and peer pressure.
Union role	Work organization, production pace, and job design defined exclusively by company.	Job content, wage system, and prerogatives regulated by contract. Union engaged in questions of plant management's structure and staffing.
	Clear structure of interests. Team closely tied to plant management.	*Autonomy—a social compromise.* Work organization expresses partly opposed interests.

minutes to hours and that makes it possible for workers to set their own pace could improve working conditions.

During the 1970s and 1980s, Sweden, unintentionally, was a laboratory of sorts for experimenting with different assembly systems. This made it possible to study empirically the significance of the production design on working conditions. In chapters 10 and 11, the line plant TC is compared with four other assembly

plants, each representing a distinct production design along the scale from modified to long-cycle complete assembly. The comparison provides very clear results. The further one gets from short-cycle line assembly, the better the results in the areas of job variety, skill development, the taking of responsibility, and room for use of knowledge and skill at work. The further from line assembly, the less common are psychosomatic symptoms caused by work stress, such as stomach pains, headaches, and sleeping difficulties. The results show that the highly significant differences in the working conditions at these plants are directly related to their production design and, overall, the great potential in abandoning line assembly in favor of complete assembly and long work cycles.

There is a widespread management myth that the majority of workers prefer monotonous and mechanical jobs. This view was propagated by Henry Ford in the 1920s and has recurred ever since. My study of TC and other assembly plants yields a very different picture. In all factories and among workers of all age groups and educational levels, those with monotonous jobs expressed a strong desire for more variety and better development prospects. Moreover, the overwhelming feelings of boredom and tediousness on the line were not ameliorated by job rotation between different stations, an important and often heralded feature of the Japanese approach. This was sharply borne out at the TC plant, where 90 percent of the workers participated in extensive job rotation yet 80 percent considered the work to be so monotonous as to be degrading. Feelings of distaste at the prospect of work were widespread, and the frequency of physical ailments was high.

Based on the Swedish experience, there is a strong interdependence between changes in organization and technical design. The freedom of "organizational choice" is restricted in manufacturing. In processes where jobs are fragmented and standardized and autonomy is low, Taylorized forms of organization tend to reappear again and again. Thus, it has proved to be very difficult to implement group work at the assembly lines in Sweden, in the sense of self-regulating units assuming delegated responsibility. And it is not by chance that the Japanese version of teamwork, which takes place without changing the basic technology and work structure, is accompanied by a reinforced management structure, intensive personnel selection, and a rigorous factory regime. Much of the Swedish development in the 1970–90 period, which is analyzed in this book, can be seen as a search for a new model in which novel technical designs enable workers to perform holistic work tasks as the basis for robust and qualified group work and organizational decentralization.

The Volvo Trajectory

In the early 1970s, at the end of a long period of very high employment levels, workers throughout the industrialized world began to revolt against Taylorism. Turnover, absenteeism, and recruiting problems all worsened and wildcat strikes

were a frequent occurrence. The "blue-collar blues" became a recurrent theme in the mass media, and there was great interest in alternative organizational forms and in humanizing industrial work. In most cases, however, the interest was short-lived. The long period of expansion was succeeded in the mid-1970s by energy crises and recession, and the interest in alternatives declined dramatically, particularly in Japan and the United States.

As David Jenkins (1981:17) has emphasized:

> A fundamental de-radicalization occurred. Lordstown proved to be not the first in a series of spontaneous revolts against the assembly line, as some observers expected, but rather both the first and last in the series. Monotony and fatigue at work, energetically discussed during a short period, faded from the public debate. The quality of work life appeared a low-priority question, and many companies which had been active in this area turned on the brakes.

Unlike much of the rest of the world, in Sweden the pressure from the labor market, despite some variations in the business cycle, never really ceased. Except for a few years at the start of the 1980s, unemployment remained at less than 2.5 percent. The labor force participation rate was high and rising; at the close of the 1980s, more than 85 percent of the population between sixteen and sixty-four years of age were in the labor force. At the same time, the wage differentials between different sectors and companies were small. This made it very hard for companies to compensate for a bad working environment and arduous work with high wages and good benefits. It also increased the engagement and interest of the trade unions in the work environment and organization.

The greatly increased product variation in the auto industry during the 1980s was yet another motive for developing more flexible and integrated production systems. This was especially true in the manufacture of heavy-duty commercial vehicles, trucks, and buses—products of great significance for Swedish industry. (Within the Saab-Scania group, the truck and bus division Scania has always been responsible for the majority of the corporate profit, whereas Saab, the car division, has experienced recurrent economic problems.)

Increased demand for flexibility was occurring internationally. What created the special climate for change in Sweden was the simultaneous pressure from product and labor markets. The heightened demand for flexibility and quality increased companies' dependence on a stable and committed work force. Concurrently, the high employment level made it difficult to recruit and keep workers in Taylorized industrial jobs. Creating new production systems adapted to human demands—what in Europe has been referred to as "anthropocentric production systems"—came to be seen as a strategic necessity for coping with personnel problems. Under these conditions, the influence of the unions in the companies' planning and investment decisions also increased.

The Volvo Group played a major role in the search for alternative production

systems. The laborious development of a new auto assembly system is well illustrated in the histories of the three Volvo factories Kalmar, LB, and Uddevalla. (A detailed analysis of each is in chapters 7 and 8.)

Planning for Kalmar was begun around 1970, during an intensive period marked by powerful demands for reform and rapid growth in volume. The plant was inaugurated in 1974. It was a small operation, with a capacity of thirty thousand cars per year per shift, but Volvo planned to build another factory of the same type in the United States with the capacity to make one hundred thousand cars a year. Three years after Kalmar was begun, however, Volvo's profits fell drastically, plans for the U.S. plant were shelved, and the organizational climate in the car division became much more conservative.

The truck factory LB was planned at the close of the 1970s and began operations in 1982. It had the capacity to produce six thousand heavy trucks per year per shift. At the time the factory opened, the reform climate in Sweden was rather weak, but the boom in trucks was without equal. Furthermore, Volvo Trucks in Gothenburg was encountering significant problems in the labor market, which was propelling the search for new solutions. An important point of departure was the conviction of management that "people won't want to work on a line in the future." The trade unions played very little role in the development of the Kalmar plant. In the planning of the LB plant, however, which began a short time after new labor legislation that strengthened the role of organized labor, the unions participated from early on and remained intensively engaged in shaping the decentralized group organization.

Finally, the Uddevalla project was begun in 1985, the year in which Volvo was the world's most profitable car manufacturer. Sweden was again in a period of intensive economic expansion, during which the labor shortage was acute. At the same time, an extensive debate was taking place about cumulative trauma injuries in repetitive industrial jobs. More broadly, there was renewed general interest in the reform of working life. Attempts to solve these problems and at the same time raise productivity through the comprehensive automation of assembly had failed both in Sweden and abroad. The trade unions participated with full-time officers from the start of planning for the plant, and the local of the Swedish Metal Workers' Union was actively supported by the national staff. Other sections of the auto industry also began projects for change, but none of them had as comprehensive and consistent ambitions as Uddevalla, where small, autonomous teams build complete cars (in ergonomically correct positions) in work cycles lasting several hours. The plant attracted wide public interest as an example of the most fundamental attempt so far to solve the problems of auto work identified by American researchers in the 1950s: the inexorable rhythm of the line (with no chance of varying the pace), the overwhelming monotony and repetitiveness of the work, the heavy physical strain, the lack of free movement, and the difficulty of gaining a sense of purpose and meaning in the fragmented work process.

The authors of *The Machine That Changed the World,* who never visited the plant but who were very eager to establish the virtues of Japanese lean production beyond any doubt, felt compelled to condemn the concept as neocraftsmanship nostalgia and "a return full circle to Henry Ford's assembly hall of 1903" (Womack, Jones, and Roos 1990:101). This superficial assessment missed the novelty of the concept: the combination of small-scale assembly with a largely automated materials-handling process, a computer-integrated information system, a comprehensive development of new assembly tools, and significant new forms of vocational training. At Uddevalla, the anthropocentric strategy within the Volvo Group culminated in what could be called a transcendent production system. Assembly work had the potential of transcending the confinements of Taylorized fragmentation and thereby attaining a new intellectual quality. Workers could thus achieve an intimate understanding of the production process and its individual functions, as well as a sense of meaningful participation in a large productive organization.

According to Womack, Jones, and Roos, Uddevalla would never achieve the levels of productivity of a conventional mass-production plant, to say nothing of lean production. In fact, the plant reached the productivity levels of Volvo's "mass-production" plant in Gothenburg in 1991, two years into operation.

In addition to the above factories at the end of the 1980s, an operation was begun at Volvo Trucks in Gothenburg in which integrated teams built complete chassis in docks. The purpose was both to develop a flexible form of production for the assembly of the most complex products and to upgrade assembly work in order to meet rising demands from the labor market, and especially from young workers.

The technical and organizational changes at Volvo must be understood against the background of the changes in Sweden's product and labor markets. They are not, however, a simple reflection of these changes. Both Volvo and Saab-Scania encountered the same overall driving forces for change in Sweden. In Scania's least standardized manufacturing section, the bus operation, new work forms were developed that were very similar to those in Volvo (see chap. 6). Saab was much less successful. Its attempt at the close of the 1980s to design an innovative assembly plant in Malmö was marked by incompatible approaches, and when the plant opened, Saab was in a sharp slump in sales. In 1990, the company had the capacity to produce 180,000 cars but it could sell only 90,000. So, although the Malmö plant managed to produce the best-quality cars in the history of the Saab, the new CEO from General Motors, which had taken control in 1989, found the situation untenable and closed down the factory.

Generally, Volvo—both the truck and the car lines—went much further in its innovations. Neither its Kalmar nor its Uddevalla factory had any counterpart at Saab. Volvo's "culture" and high profile were heavily conditioned by the interests and policies of its management and, in particular, those of the CEO,

Pehr G. Gyllenhammar. His orientation had great import, partly because of the absence of dominant owners at Volvo, which gave the CEO tremendous power. Other significant factors in the Volvo culture were the unions' strong position in the company and the unusually open perspective among its engineers, which allowed a great deal of space for trying new approaches.

The social conditions in Sweden were also very important. During the 1970s and 1980s, tellingly, the assembly-line regime was never questioned at Volvo's auto and truck factories in Ghent, Belgium. The Belgian car factory produced the same product as in Sweden, but conditions in the Belgian labor market were altogether different. Specifically, unemployment was higher than 10 percent, job security was much more limited than in Sweden, and unemployment as well as sickness benefits were considerably less generous.

A number of events in 1990 signaled that Volvo had entered a new phase. A decade's expansion was followed by sharp contraction, in the wake of a swiftly deepening recession in Sweden; severe downturns also occurred in Volvo's other two main markets (the United States and Great Britain). Gyllenhammar, who for twenty years had been at the helm of the company, withdrew as CEO and became chairman of the board. In the same year, a comprehensive and complex alliance was forged with the French state-owned Renault Corporation, a firm with technical, social, and cultural values very different from Volvo's.

Need for a Plurality of Production Concepts

Eighty years ago, the Ford Motor Company developed a single standard way of manufacturing automobiles. Toyota and the Japanese auto firms have taken this standardization even further, to the point where their plants in North America are considered clones of their operations in Japan. The opposite is true for Volvo. In a unique manner, the company's assembly plants embody a great variety of technical and organizational concepts, reflecting the place of each plant in the Volvo trajectory, the different market conditions for its three main product lines, and the different social conditions in Sweden, Belgium, and North America, the principal regions where Volvo operates. As a result it is difficult to speak of "Volvism" in the same way as one may speak of Fordism or Toyotism.

As the world's second largest producer of heavy trucks and the third largest producer of heavy buses, Volvo's international position in heavy commercial vehicles is very strong. Unlike cars, these vehicles are produced in rather small-scale operations. The demands for flexibility and responsiveness to special customer requests are exacting. In the late 1970s, the bus divisions at both Volvo and Scania pioneered modern forms of long-cycle stationary assembly in small teams (so-called dock assembly). After a difficult breaking-in phase, dock assembly became very successful.

In 1989, Volvo Buses decided to introduce the same concept in the newly acquired British Leyland Company. This was done at the same time that the Leyland plant in Workington was being refitted to make Volvo chassis. The object was gradually to spread the organizational model of work teams and stationary assembly to the production of British buses. In the United Kingdom, Volvo had no need to make its jobs more attractive; however, it expected to attain quality advantages by applying the Swedish concept. Another objective was to achieve symmetry with the manufacturing system in Borås.[1]

Volvo Trucks followed two production strategies. In 1990, a substantial expansion of the Ghent facility, which functioned more or less according to traditional principles, was planned. The objective in Gothenburg, however, was to expand the new dock assembly and increase capacity at the group-organized LB plant. Production in Volvo's truck division was thus less centralized and technology-intensive than in the car division. According to senior production managers, having two different production strategies was not a burden but an advantage—it corresponded to the differentiated product structure and labor market requirements of the 1990s. The large pool of disciplined Belgian labor was used for the rationalized line assembly of a simpler product mix. At the same time, alternative forms of production were developed in Sweden to supply the flexibility required for the most complex and customized types of assembly, as well as to answer the strong demands by workers for variation and expanded job content. This does not mean, however, that Volvo's capacity or interest in workplace innovation was confined to Sweden. Thus, in its greenfield site in Curitiba, Brazil, which produced trucks and buses, Volvo management did not "go native" in the sense of simply adopting local practices. Instead, it made considerable efforts to reorganize work, upgrade workers' skills, and develop a participative culture.[2]

By contrast, in the passenger car market, Volvo's standing was much weaker, the pressure for lean production was stronger, and the scale and standardization of production was far greater. A plurality of work concepts could be an asset in the truck business because of its mix of both standardized and widely customized products. In car production it was mainly a disadvantage, however, since it implied that the same models were produced using different methods in different plants also within Sweden.

In 1990, which was a year of plummeting sales, Volvo's total Swedish output was 160,000 cars. Of these, 75 percent were assembled at the Gothenburg plant TC, which in spite of a number of attempts at reform still operated largely on the basis of line production. The innovative Kalmar and Uddevalla plants accounted together for the remaining 25 percent. Kalmar, the pioneer of the 1970s, consistently outperformed the main plant, TC, during the 1980s but never reached the high productivity levels at Ghent. Uddevalla, which was opened in 1989, was still

in the start-up stage. The plant had demonstrated its flexible capacity by coping with the introduction of Volvo's new 900 series much more smoothly than other production installations had done. In 1991, Uddevalla matched the performance of TC, but at both plants it was considerably below that of Ghent, which was one of Europe's most productive assembly plants in its segment. With a rapid stabilization of the work force, the potential for improvement within Uddevalla's "transcendent production" was great, and the plant was working intensively to make further progress (without much support from corporate management). So were the other plants, however, all of which were struggling to survive this period of excessive overcapacity at Volvo.

Dogmatic Emulation or Dynamic Synthesis?

Since 1980, Japan has been the world's number one car producer. Since 1985 it has also been the global leader of new technologies and product offerings. These accomplishments have been possible because of innovations and new approaches in a vast array of areas: relationships with suppliers are at the same time long term, collaborative, and intensely competitive; the product design process has a fierce tempo, and there are close relations between the departments of development and manufacturing; and the emphasis in production control is on continuous improvement. Japan's manufacturing excellence has been a result of its focus on the shop floor, a characteristic of late industrializers. The quality control (QC) techniques, JIT delivery system, and the total productive maintenance (TPM) philosophy emerged from this shop-floor focus. The personnel policy of the Japanese transplants, with its egalitarian thrust, commitment to job security, emphasis on working with pride, and involvement of blue-collar workers in process development, also entails important contributions. Intense domestic rivalry and a demanding and sophisticated product market have fueled the development of the Japanese auto production system. The auto companies have also been privileged to have acquiescent unions and highly dependent workers who submit to the relentless demands. Thus, Japanese firms—with the exception of a short period before the first oil crisis, when "humanization of work" was an issue in Japan—never had to confront and change the character of the work itself, such as its fragmentation, intensity, and inexorable mechanical control. Japanese workers have resented the work but complied.[3]

The range of Swedish innovations has been much more narrow, as is proper for a small nation. The Swedish auto firms of the 1980s were minor players in the industrial world, and their contributions of new ideas and organizational forms have been restricted to manufacturing and the handling of customers (Volvo in Europe pioneered lifetime service contracts and other forms of sophisticated services). As in Japan, there has been a strong shop-floor focus but for a very

different reason: in Sweden, the labor market and its increasingly exacting demands triggered much of the innovation and change. Technical redesign of the production process to relieve workers of mechanical pacing, to make reintegration of fragmented tasks possible, and to create a basis for true team production (as opposed to administratively engineered teams) has been one important feature. Another has been the strong interest in improving the physical work environment and ergonomics through technical as well as organizational means. Yet another has been the endeavor to "democratize the workplace" and develop sustainable forms of shop-floor self-governance. Finally, there has been extensive labor-management collaboration; unions are independent and important partners in company activities, including the early phases of plant planning. This feature has become characteristic of the "Swedish management style," which generally is less authoritarian, more informal and egalitarian, and less inclined to rely on the formal powers of organizational position than the Anglo-Saxon type. (The development of the Swedish style has been closely related to the high degree of job security in Sweden, which has made employees less inclined to "blind obedience".)[4]

Since the close of the 1980s, the labor market in Japan has become increasingly tight. Criticism of the industrial conditions, the long working hours, and the trying physical environment are widespread. Manufacturing firms are encountering mounting recruitment difficulties, and there is soaring turnover among new hirees. Japan's Auto Workers' Union has become active in this field and has demanded a "new industrial policy." The prescription of Womack, Jones, and Roos (1990) that the West must adopt the Japanese production system lock, stock, and barrel (they explicitly warn against any attempts at modification) is out of sync with the current debate in Japan and, compared to Western "best practice," represents a regression in terms of working conditions as well as individual freedom.

After World War II, the Japanese approached Western countries, especially the United States, because they wanted to learn, transplant, and transform. The real challenge for the 1990s and the next century is to amalgamate the contributions of lean production and of European human-centered manufacturing to create new syntheses.

Theoretical References and Empirical Sources

From The Degradation of Work *to* The End of Mass Production

Research in industrial sociology during the 1970s was heavily influenced by the notion of the degradation of labor, as a result of the continuing spread of the

organizational principles of scientific management. Harry Braverman's powerful study on this theme, *Labor and Monopoly Capital* (1974), had many successors in the so-called labor process school. In Germany, research largely followed the lines laid down by Horst Kern and Michael Schumann's exemplary study *Industriearbeit und Arbeiterbewusstsein* (1977). The debate in Germany was more sophisticated than in the United States or Britain, but it had the same general message.

The investigations I started in the Swedish auto industry in the early 1980s were inspired by these theories, but not in the sense that I sought their confirmation (that was all too easily found). On the contrary, what interested me was alternative forms of rationalization, leading to reskilling and enhanced autonomy. At the time this was a rather original point of departure. By the mid-1980s however, it was far from being so. A dramatic shift had taken place in industrial sociology. Braverman's theses, which earlier had met with such approval, were succeeded by notions, quite opposite in character, on the themes of flexible specialization and requalification. In the United States, Michael Piore and Charles Sabel played a critical role in this reorientation. In Germany, this role was played by Kern and Schumann, who, in a book with the title (typical for the time) of *Das Ende der Arbeitsteilung?* (1984), claimed that industrial rationalization had taken a new turn and tended now to dissolve the division of labor in precisely those sectors where earlier it had been most strongly rooted.

In my own work, this post-Fordist debate, with its stress on the demands and changeability of the market and the economic limits of the division of labor (themes wholly absent in the studies of the labor process school), has been an important inspiration. At the same time, there is cause to be critical of many of the ideas at the root of the thesis that there has been a shift in the industrial paradigm. The notion of "the end of mass production" is central to the flexibility theorists, starting with Piore and Sabel (1984), and has been picked up by Womack, Jones, and Roos. Piore and Sabel played an important role in "discovering" the Italian industrial districts as a mode of production and organization very different from the American Fordist model. Michael Porter (1990) elaborated on the competitiveness of these districts not only in textile, fashion, and design but also in a wide range of customized machinery. But paralleling the rise of flexible specialization, there has been an ever-increasing range of mass-produced goods, from video cameras and VCRs to microwave ovens and fax machines (see Cutler et al. 1987). True, many companies such as the auto manufacturers offer a great many more options and models than in earlier decades, yet they remain mass producers that are highly dependent on economies of scale (see Luria 1990).

In this new kind of flexible volume production, the Japanese car producers are the modern masters, representing a production system and industrial structure squarely different from the Italian districts, a point Piore and Sabel unfortunately gloss over. The Japanese preference for high volume and standardization as a basis

for offering a variety of features and options is also stressed by Porter, whose massive study *The Competitive Advantage of Nations* (1990) contains a much more compelling analysis of the Japanese dynamism than is found in the MIT texts. Japanese firms are very competitive in such industries as cars, consumer electronics, semiconductors, and standardized machine tools. They have not invented any universal production or management system, however, and Porter finds them to be much less successful in industries demanding customization and individualized customer relations: "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" (411).

Another drawback of much of the flexibility debate is that the strong interest in changed product markets and new technology as driving forces for new production strategies tends to obscure the significance of labor market conditions and the role of trade unions, government policies, and national institutions in general.[5] It is precisely the importance of the latter set of conditions that the Swedish case powerfully underscores: high employment levels and strong trade unions were of decisive significance in the development of work patterns involving a qualitative enhancement of autonomy and self-management. This weakness in the flexibility discourse is closely tied to a reductionist perspective in which increased market variation and product flexibility are followed directly by new work forms and more qualified jobs. But which strategies companies use to cope with demands for flexibility and what the consequences for work are cannot be deduced from developments in product markets; rather, these consequences must be traced through empirical study. In the case of the careful empirical investigation of changes in industrial work, both the American industrial sociology of the 1950s and the labor process school of the 1970s are superior to the flexibility discourse. The workplace studies in Kern and Schumann's *Das Ende der Arbeitsteilung?* lack the methodological rigor, systematic approach, and massive empirical basis of the earlier *Industriearbeit und Arbeiterbewusstsein* (1977).

Piore and Sabel favor modern craft work that is able to take advantage of advanced technology yet flexible in meeting market demands, but they provide few empirical examples of firms that have such jobs. Their argument is further weakened by their attempt to portray the Japanese production system as a new form of "craft control." Womack, Jones, and Roos correctly reject this ill-informed notion in *The Machine That Changed the World* (1990). But their own treatment of the working conditions under lean production are sloppy and speculative, and the generalizations from the car industry to all forms of industrial production lack any qualifications. In some ways the book is more a piece of propaganda than of science. Nevertheless, their study is an important source for reference (and criticism) throughout my book. The comparative studies of plant productivity (and to a lesser extent productivity in research and development) are

impressive, and the style of writing, in which all the parts seem to move in the same direction, is forceful and an obvious reason for its great impact.

In contrast to much of the flexibility debate, comprehensive field studies and surveys of working conditions play a central role in this book. Extensive interviews with managers, from the shop floor to the executive level, are also important. At the core is a series of case studies of the Swedish auto industry, carried out from the late 1970s through 1990. For the analysis of the often ambiguous working conditions in new work settings, German industrial sociology, especially Norbert Altmann's Institute for Social Research in Munich, has provided a major inspiration. The Scandinavian sociotechnical tradition and European studies of industrial democracy have been other points of reference, especially for the investigation of group work and participation. The development in Sweden is contrasted with the characteristics of Toyota's production system, in Japan and in the Japanese transplants. These comparisons depend on cumulative analysis of materials derived from many sources and lack the systematic character and empirical rigor of the Swedish case studies and surveys. In important respects, my discussion of the Japanese management system has been influenced by the Berlin project *The Future of Work in the Automobile Industry* (Jürgens, Dohse, and Malsch 1989).[6] As a whole, this book may be seen as an offspring of the broad debate of the 1980s among European researchers and industrial practitioners concerning anthropocentric or human-centered production concepts.

Plan of the Book

The focus of this book is automotive production and assembly work. It was in this process that the Fordist revolution had its most dramatic impact with the birth of the mechanical assembly line in 1913. It has been a classical terrain of industrial sociology ever since. The developments in the 1970s and 1980s have made a revisit imperative. Moreover, it was in the assembly plants that the Swedish auto firms experienced their greatest personnel and productivity problems and, consequently, where they were most innovative. A final reason for the focus is that the proportion of human assembly work in auto manufacturing has been increasing steadily for a long time because of the relative failure of mechanization in this area compared to machining or body welding.

Chapter 2 analyzes the dominant industrial paradigm of the 1980s, the Japanese production system, from the Toyota revolution to the experience of the transplants. I move from there to the Swedish experience. Chapter 3 presents the development of the Swedish automotive industry from 1970 to 1990, emphasizing the differences between the car, the truck, and the bus business. Chapter 4 highlights important features of the labor market and union structure and then summarizes the specific reasons for change in Sweden.

Chapter 5, a preamble to the case studies in chapters 6, 7, and 8, outlines the basic concepts and models that guide the subsequent case analyses. This conceptual framework differs in some respects from the frame of reference used in chapter 2; I have chosen to present each paradigm by focusing on its specific distinguishing features rather than applying the same structure everywhere, and these features are not necessarily in the same areas. Three broad themes recur in both the Swedish and Japanese cases—the forms and contents of skill development, the preconditions for autonomy, and the nature of teamwork and how these three issues are linked to technical and organizational design.

Chapter 6 addresses the Swedish pattern of assembly design from the periphery by analyzing the radical and unknown experiences of the bus manufacturers. Long ago they proved the viability of autonomous assembly of complex products in extended work cycles. Chapter 7 examines the first and second stages of the Volvo trajectory proper: the Kalmar car plant and the LB truck plant. Chapter 8 proceeds to the third (and last?) stage, the Uddevalla plant, elucidating how its original design came about as a rational solution to a number of pressing problems. This chapter also contains a discussion of the arduous and largely aborted process of change at Volvo's main brownfield plant, TC, which started operation in 1964.

Chapter 9 is a methodological prelude to the survey studies. This chapter discusses the problems and pitfalls of comparative studies of working conditions and possible solutions. Chapter 10 presents the survey results from the assembly line at TC as a benchmark for the subsequent comparisons. Chapter 11 analyzes working conditions in five assembly plants with different technical designs. Chapter 12 continues with an investigation of group organization and worker influence in everyday decisions. Finally, chapter 13 summarizes the empirical chapters and pulls together the different elements. Thereby I return to and elaborate on the main argument presented in this introduction—the need for a new synthesis in manufacturing as a strategy for postlean production.