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3 Strategic Adjustments in Training: A Comparative Analysis of the U.S. and German Automobile Industries

Peter B. Berg

3.1 Introduction

Throughout the 1980s and into the 1990s, manufacturing firms in most industrialized nations have sought greater organizational flexibility in response to intensified international competition based on product quality and process innovation. This is especially true in the automobile industry where firms are experimenting with new forms of work organization, new human resource strategies, new uses of technology, and new work-force participation schemes (Womack, Jones, and Roos 1990; Dertouzos et al. 1989; Hirst and Zeitlin 1989; Piore and Sabel 1984; Tolliday and Zeitlin 1987; Kochan, Katz, and McKersie 1986; Kern and Schumann 1985; Hyman and Streeck 1988; Düll 1985). Much of the research on work restructuring examines the effects of industrial relations practices, the use of technology, and management and union strategies on the structure of employment systems (Hyman and Streeck 1988; Kochan et al. 1986; Katz 1985; Katz and Sabel 1985). Adjustments being made to training practices and the effects of these practices on organizational flexibility have not been adequately isolated and analyzed in the discussion of workplace restructuring. It is often maintained that increasing the internal flexibility[1] of the firm results in increasing skill requirements for work-

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References within the text to the German automobile industry refer to automobile production in the former West Germany only.

1. For the purposes of this paper, I concentrate on what Atkinson (1987) has referred to as "functional flexibility." Functional flexibility focuses on how labor is deployed within the work

ers and the need for more worker training. There has been little empirical data gathered, however, to assess how the types of training offered to different groups of workers have actually changed, which groups of workers get access to training under flexible work structures, and how these training practices differ across countries. Furthermore, there has been little examination of the role existing educational and training institutions play in facilitating changes in training strategies.

Most studies on firm-provided training focus on the relationship between wages and training, after controlling for other employee demographic variables, as well as on broad descriptions of training practices within firms. Recent studies include those by Mincer (1983, 1988), Brown (1989), Lillard and Tan (1986), Pergamit and Shack-Marquez (1986), Barron, Black, and Loewenstein (1987), and Lynch (1988, 1992). These studies find a high individual rate of return to training but show that most firm-provided training in the United States is concentrated among managerial, professional, and technical employees.

Other quantitative studies using company-based surveys on training provide more information about training at the firm level than the studies cited above (see, e.g., Bartel 1989; Barron et al. 1987; Bishop 1988; Lusterman 1977). The major findings of these studies include that larger high-tech firms provide more training than smaller firms. These studies, however, are neither able to capture the dynamic adjustment process training is undergoing nor able to provide detailed comparisons with other industrialized countries.

More detailed analysis linking training to changing work structures and labor market institutions at the plant level is needed to explain how training affects work restructuring within industries in different countries. A number of "institutional" studies have analyzed how training institutions and practices in different countries influence the structure of jobs and the employment system as a whole (Steedman and Wagner, 1989; Steedman, Mason, and Wagner 1991; Osterman 1988; Maurice, Sellier, and Silvestre 1986; Mehaut 1988; Daly, Hitchens, and Wagner 1985; Hartmann et al. 1983; Maurice et al. 1980). Although these studies demonstrate the important role training plays in the restructuring of work, more empirical work is needed in order to understand how training practices affect the ability of firms to restructure their employment systems and in order to provide insight into other institutional factors that influence this restructuring.

Using new microlevel data on training—gathered through detailed interviews with managers in production, training, and human resource departments, as well as with labor representatives, at nine unionized automobile plants in the United States and nine automobile plants in Germany—I show how various

process, the skills of workers, and the extent to which the organization of work facilitates adjustments to market demands.

institutional factors combine to influence plant-level training practices and their effects on efforts to achieve the organizational flexibility necessary to produce diversified products of high quality. The analysis divides the training offered at the plant level in the two countries into different categories—product and process training, teamwork-plus training, and technical training. I examine the number of hours of training and the quality of training that are offered within these categories to different groups of workers across the two countries. I then analyze the effect training practices have on fostering employment system flexibility within individual plants.

3.2 The Institutional Background

The rise of more flexible employment systems in the 1980s has increased the demand for workers with broader skills. However, the ease with which firms find workers with these broader skills or are able to retrain their incumbent workers depends on the structures and institutions that surround work processes and influence individual and group behavior. These institutions are not the same in every nation; in some countries firm training practices may foster employment system flexibility, while in other countries training practices may frustrate such flexibility. Therefore, to understand how training practices relate to and influence employment systems, one must first understand the institutional environment in which firms in different countries operate.

3.2.1 The Structure of Occupational and Further Training

United States

The majority of occupational training in the United States takes place at the secondary level, in high schools, or at the postsecondary level, in junior colleges, community colleges, and technical schools. Occupational, or vocational, training in the United States does not actually constitute a national system. Variation among states in governance, administration, and control of these institutions leads to training differences across similar occupations and to difficulties in distinguishing one type of school from another. Curriculum and standards vary across states and localities, are often heavily influenced by local industries, and concentrate on specific rather than general skills (Grubb 1984; Jacobs 1989; Hamilton 1990).

The dominance of school-based occupational training gives enterprise-based, i.e., apprenticeship, training only a small role in postsecondary occupational education. Although it involves a small portion of those receiving occupational training, apprenticeship training is an important means for industrial firms to secure a skilled work force. In the auto industry, apprenticeship training is primarily established for adults already employed. It is the means by which nonskilled workers get access to higher wages and skilled work off the assembly line. The federal government has regulated apprenticeship training

since the 1930s; however, the federal role is limited to recommending minimum standards for apprenticeships in certain occupations. The actual standards of apprenticeship training are established through the collective bargaining process between unions and management.

In the unionized sector of the auto industry, the United Auto Workers (UAW), along with management of the various companies, sets the apprenticeship standards for the skilled trades. The UAW supports 33 apprenticeable classifications in the basic trades. The Skilled Trades Department of the UAW works with the National Joint Company/Union Skilled Trades and Apprenticeship committees to establish a general outline of topics to be taught in a particular apprenticeship. Various "work processes" are learned on the job during the apprentice's daily eight-hour shift. The apprentice learns these work processes under the supervision of a skilled tradesperson. This training is very broadly defined and relies on the individual skilled tradesperson to teach the apprentice the various processes during the working day. The topics under "related instruction"—including math, science, shop, and drawing—are taught at a local community college in the evening, two to three nights a week in two-hour sessions. In total, 93 percent of apprenticeship training time occurs on the job and seven percent in the classroom.

The content and form of an apprenticeship is determined by local joint apprenticeship committees composed of an equal number of members representing the company and members representing the union. The committee contracts with a local college to perform the related instruction. The actual training one receives as an apprentice is very much dependent upon the job structure and organization of work at one's particular plant. Thus, workers receive firm-specific or even plant-specific training rather than broad occupational skills training. The industrial apprenticeship system does a poor job of providing these broad occupational skills for several reasons: there is not consensus among national educators or the representatives of management and labor on what skills and standards are important for a particular occupation; not all the costs of general occupational skills training can be shifted to workers, and management is often reluctant to take on the risks associated with such training; and labor unions have traditionally focused on job control as a way to achieve higher wages and employment security, rather than on training in broad, transferable skills.

In U.S. plants, occupational training has only a minor effect on the composition of further training (formal training within the firm). The vast majority of training for production and maintenance jobs has been firm specific and traditionally occurred informally on the job or formally in apprenticeship programs. Several factors combined in the U.S. auto industry throughout the 1980s, however, to bring about more formal training for the work force and to link training with the strategy of restructuring toward greater internal flexibility. The use of complex, computerized production equipment has increased job requirements significantly in the areas of body welding, machining, and

stamping. Greater knowledge of electronics and mechanics is needed to monitor and troubleshoot the equipment. In addition, the need to produce higher-quality products has increased the need for skills in communication and for greater understanding by the work force of the product and the production process.

Prior to the 1982 recession, training for nonskilled workers in the United States was conducted primarily on the job. Workers would learn new jobs through trial and error. The skilled trades received some technical training, but because the extent of robotics and computerized machinery in production was minor, the amount of such training tended to be small. The automobile companies saw no advantage in increasing the responsibility of their workers or involving them in decisions. However as the market worsened, the automobile companies, in conjunction with the UAW, began to experiment with new ways to increase productivity and product quality. Joint training programs were established to increase the general skills of the existing work force and to retrain those workers on permanent layoff.

These training programs were negotiated nationally during the 1983–84 round of bargaining as part of the joint national employee development and training program. This program is funded jointly by the local UAW union and the company. The company contributes ten cents per worker-hour and the union five cents per worker-hour into this fund. Under the agreement, the union's contribution goes into a local fund (the nickel fund) for plant-level training that is not specifically job related. The contribution from the company goes to the central human resource, or training, center that each company has established in Detroit. These training centers and their satellite centers around the country were originally established to retrain and help find jobs for the 150,000 auto workers who were laid off during the 1982–83 recession. After fulfilling their original mission of retraining laid-off workers and helping them find new jobs, the training centers shifted focus and began to hold seminars for union and management trainers to teach them how to conduct a needs analysis at their plant, select training programs from equipment vendors, and evaluate the success of their plant training programs.

This joint training agreement led to a participatory role for local unions in the automobile industry. The local union in the United States traditionally has representatives on the local joint apprenticeship committee, which oversees the apprenticeship program at the plant; however, under this agreement on training, the local union president and shop chairperson, along with the plant and personnel manager, serve on a training committee and approve all nickel fund allocations. Some automobile plants also have local union representatives in the training department who help create and implement training programs, while other plants only inform the local union of training activities. Although access to training is decided by seniority and by the needs of the supervisor, local unions have been successful in ensuring that many workers have access to general training from the nickel fund. However, not all local unions use this

participatory role effectively. Many local unions simply acquiesce to management and concede on issues, either because they are overwhelmed by their new role as participant or because of a deep concern for losing jobs.

Germany

In contrast to the U.S. occupational training system, the primary method of occupational training in Germany is the enterprise-based apprenticeship system. Under this system, businesses fund both classroom education and apprenticeships at their firms. In addition, the German education and training system has a federally regulated curriculum. Upon completing the training requirements, a student (17–21 years old) is given a diploma that certifies that he or she has met the nationally established standards of his or her occupation. For a young student, an apprenticeship represents a career investment; the wage of a first-year apprentice is typically only 22–33 percent of the going skilled worker wage. This contrasts with the typically older first-year industrial apprentice in the United States who earns 65 percent of the skilled worker wage.

The standards and curriculum for apprenticeships in Germany are established by a national tripartite board consisting of representatives from labor unions and employer associations as well as from the economics ministry of the government. Making sure that this curriculum is implemented (for industrial enterprises) is the responsibility of local chambers of industry and commerce. The vocational training committees of these chambers consist of equal representation of employer and employee representatives and vocational school teachers; these teachers, however, have only an advisory role on the committees. These chambers have the authority to assess the suitability of firms to provide training, monitor the training contracts of firms, advise firms on how to improve their apprenticeship training, arbitrate conflicts between apprentices and firms, and administer final competency exams for apprentices in their region.

Apprenticeship programs in Germany differ substantially in content and standards from industrial apprenticeship programs in the United States. Young apprentices are expected to know the fundamental principles of their trade before they are able to practice it. Simply being able to perform the task of a skilled worker at a particular plant is not enough. Federal standards require that apprentices learn the theory behind their trade and some of the theoretical principles of related trades. German apprentices are trained beyond the needs of any one particular job or task.

German firms have responded to demands for more broadly trained workers by redefining occupations within the existing training system. The demands for flexibility along with the need to update the content of the industrial apprenticeships, which had not been formally changed since the 1930s, led Germany's tripartite board to officially alter its electrical and metalworking occupations in 1987. The 42 metalworking occupations were reduced to 6 broadly defined occupational groups with various areas of specialization.

In the past, metalworking apprenticeships consisted of one year of training in an occupational group and two years of training in a specialized area. The new apprenticeship structure calls for a year of basic occupational training for all metal trades, a year of training in each general occupational group, and 1.5 years of training in a specialized area. Under this structure both worker and management interests are satisfied. The first two years of training are broad, giving workers a firm foundation of knowledge that will be relevant throughout their working lives and giving them the ability, during the final 1.5 years of training, to specialize very rapidly in certain areas important to the firm.

The reorganization of occupations has also led to a new metalworking occupation (industrial mechanic) with a specialty in production mechanics. This occupation is specifically designed for the production department. In particular, it represents the strategy of the German auto industry to upgrade production work and get more skilled workers involved. The skilled workers in production mechanics are trained to be system operators—those workers who monitor transfer lines of production equipment, maintain the equipment, diagnose problems, and make the necessary repairs on the spot. The importance of this trade is reflected in its growth within the auto industry; the majority of first-year apprentices in the plants surveyed were either in the industrial mechanic (production mechanics) or industrial electrician (production electronics) occupations.

In addition to new occupations, the method of training has changed from emphasizing lectures and narrow assignments to emphasizing group projects and independent thinking. Apprenticeship training is designed to teach young workers not only the technical aspects of their occupation but also how to work and communicate with other workers, how to work economically, and how to assess quality. The federal curriculum specifically states that apprentices should plan their work, carry it out, and evaluate it independent of direct supervision. The apprenticeship curriculum is also designed to encourage group work among the apprentices. This was advocated by the key industrial employers association (Gesamtmetall) and the metalworkers union (IG Metall), who both felt that the ability to work in groups and interact with others was necessary for current production processes.

Unlike in the United States, labor's input into apprenticeship training in Germany occurs at several different levels (see Streeck et al. 1987). As discussed, IG Metall codetermines the structure and curriculum of apprenticeship training at the national level along with representatives of employers and government. At the regional level, labor representatives also serve on the vocational training committees within the chambers of industry and commerce. At the plant level, however, labor representatives in the works councils do not have the right of codetermination but rather the right to information concerning the number of apprentices hired and the quality of the training being conducted. Although the works councils do not have a legal right to decide matters relating to apprenticeship training, they are allowed to make their own proposals concerning

training matters. By putting forth their own initiatives, many works councils are able to exert influence over apprenticeship training. This is most likely to be the case where works councils have traditionally been very powerful and are able to influence management decisions regarding apprenticeship training. In other companies, works councils function more as monitors of apprenticeship programs, ensuring that workers are receiving appropriate training.

The role of the works council with regard to further training in the firm is similar to its role with regard to apprenticeship training. Although works councils have no legal right of codetermination in matters related to further training, they must be consulted on training matters, and most are able to give their input into who is selected to receive training. The influence of works councils in this area varies among companies; however, most works councils in the automobile industry have become active in training issues, putting forth proposals for increasing training across job groups.

To summarize, German enterprise-based training is part of a highly structured labor market consisting of well-defined occupations based on nationally standardized definitions. Employers have an economic incentive to train workers in broad occupational skills because they can pass on part of the cost to apprentices in the form of low wages, and they rely heavily on skilled workers in their production process (see Soskice, chap. 1 in this volume). The social partners in the training process (labor and government representatives) play a key role in ensuring that the training is of high quality and broad scope. The apprenticeship system is primarily designed for initial skill training of young people for careers as skilled blue-collar workers, giving them broad occupational skills that will go beyond the needs of any one firm. The ability of the training system to provide a general skill base to workers at the workplace allows for more specific and sophisticated further training after the apprenticeship. The establishment of new occupations and standards at the federal level through corporatist means has resulted in a unified response by management and labor toward work restructuring and training practices.

In the United States, occupational training in colleges or technical schools is primarily geared toward technicians and concentrates on specific skills. Only apprenticeship programs and high school vocational training can be considered systematic training for skilled blue-collar occupations. Apprenticeship training in the auto industry continues to reflect narrowly defined jobs within a traditional form of work organization. In contrast to Germany, the United States lacks any institutional training structure that encourages firms to provide general skills at the workplace and to maintain high-quality training; furthermore, an incentive system is lacking for young people that rewards them for investing in general skills. As will be shown in section 3.3, efforts at reform are occurring plant by plant, resulting in discrepancies in the quality and content of apprenticeship training across plants. Firms which need broadly trained workers must take on the risks and provide the skills themselves. The unionized sector of the auto industry has responded by sharing the costs of general skill

training through a joint training fund. While this fund is a positive development, it alone is unlikely to provide the necessary skills to support a broadly trained flexible work force and a flexible employment system.

3.2.2 The Organization of Work and Industrial Relations Effects

Market pressures have generated different patterns of work organization and different uses of labor across the two countries. In general, German plants show greater willingness to move away from traditional Taylorism and expand the use of labor than do U.S. plants. Skilled maintenance workers in German plants have been integrated into production areas, and now perform both maintenance and production tasks, in an effort to reduce downtime of production equipment and increase productivity. Where new equipment has been installed, traditional nonskilled jobs have broadened in scope. An example of this integration is the system operator positions in German plants, which are commonly found in areas with computerized production equipment; the job blends both production and maintenance tasks. Systems operators essentially monitor computerized transfer lines or work stations and are required to check the quality of the product or part with statistical process control (SPC), change machine tools when necessary, maintain the equipment, optimize the computer program for the equipment, assist with or perform major repairs, and communicate with supervisors and other departments. In German plants, 75–100 percent of these jobs are held by skilled workers in a metal trade. The number of traditional nonskilled jobs held by nonskilled workers is decreasing. Skilled jobs are being broadened to include production tasks, and ungraded semiskilled jobs are being filled by skilled workers.

Such a system operator job was not found in the U.S. plants surveyed. The job classification system in the U.S. automobile industry continues to encourage the division between skilled and nonskilled work.[2] Some plants have reduced their number of classifications and broadened the lines of demarcations between jobs; however, a blending of traditional skilled maintenance tasks and nonskilled production work has not yet occurred. In response to the need for workers to monitor computerized production equipment, U.S. plants have upgraded the jobs of semiskilled workers, such as job setters, and have created some new positions to monitor the production process, alert maintenance when breakdowns occur, and provide leadership for other workers in automated production areas.

The area of production and the use of technology also have a key influence on what is required of workers. In automobile assembly operations, there have been minor changes in the job content of assembly workers. Although the automobile has become more complicated, with a greater variety of parts, the nature of assembly work is still very manual and tied to the pace of the transfer

2. The terms "skilled" and "nonskilled" refer to the classifications given to workers and are not meant to be assessments of the actual skill their respective jobs require.

line. In the body-welding area, high automation with robotic welders has changed the skills required of nonskilled operators. Most of the operators in body welding monitor the transfer lines of robotic equipment. Monitoring duties require an understanding of this robotic equipment, the programs that run them, and the effect of their operations on the welding process as a whole. Although these operators do not do maintenance work, they are asked to identify and troubleshoot minor problems in the equipment.

In transmission and engine production, similar differences between areas are found. The jobs of workers in the assembly area have remained essentially the same. Although they are expected to check the quality of the parts they put on the engine or transmission and are responsible for the quality of their operations, their job tasks have changed little. Where assembly operations have been automated, changes in job content have occurred. Nonskilled operators no longer place the parts on the product manually, rather this is done automatically. The operator is now responsible for stacking parts on conveyors which feed the assembly robots. The operator must still check for quality, but the jobs have clearly been simplified.[3] Another result of automation in this area has been the creation of nonskilled positions to monitor various segments of the transfer-line equipment. This position requires not only knowledge of the robots and their programs and the production process as a whole but also leadership responsibility for a group of operators on a portion of the line.

The extent of input by labor representatives into matters of work organization also differs between the two countries. Works councils in Germany with the help of the metalworkers union (IG Metall) have put forth initiatives for changing work organization. IG Metall supports works councils with training information and helps them draft proposals. Although works councils possess only the right to information and consultation in matters regarding work organization, they nevertheless are able to make recommendations to management. In most plants, management works to achieve consensus with the works council before changes are made because of the possible countermeasures the works council could invoke if not consulted.

In contrast, local unions in the United States are divided on how to respond to management initiatives for fundamental change in work rules and job demarcations. Some local unions welcome change, while others resist what they view as an erosion of traditional union power. A history of adversarial relations and apprehension about participating in decisions with management has inhibited U.S. local unions from putting forth their own initiatives or from modifying management proposals. This partially explains why there is less job enhancement overall in U.S. plants than in German plants.

While work organization and job requirements in the industry are changing, the extent of these changes differ between the various work processes and the

3. Milkman's (1989) study of the Linden, New Jersey, plant provides a more detailed analysis of changes in job content as a result of the reorganization of production.

countries themselves. Work requirements in automobile assembly have changed very little, while jobs in the body-welding area have been enhanced. Assembly and machining jobs in engine and transmission production are a mixture of low-skill put-and-place work and high-skill monitoring of automated transfer lines. German plants have primarily broadened the job content of skilled workers, including nonskilled workers as a result of works council pressure. U.S. plants, on the other hand, have concentrated their reorganization efforts on upgrading nonskilled work because of the resistance of skilled workers to redefining the content of their jobs. Finally, labor representatives in Germany are more active in influencing the direction of organizational change than are U.S. local unions.

3.3 Specific Cases

Given the institutional context developed above, I now examine in more detail how specific plants are adjusting their employment systems and training practices to achieve greater flexibility and higher-quality production.

3.3.1 Survey Sample

The plants surveyed include not only automobile assembly but also engine and transmission plants. By including engine and transmission plants in the survey, a more accurate assessment can be obtained of the changes taking place in the organization of work and in the training practices in the industry as a whole. Requests for anonymity prevent me from identifying the plants by name; however, I can say that the U.S. survey focused entirely on plants of the big three U.S. producers located in the Midwest and the German survey included all the major diversified automobile producers, as well as two luxury, specialty producers. Table 3.1 provides some description of the automobile plants surveyed. In both Germany and the United States, the majority of plants are well-established, with production starting prior to 1965. A few plants were built in the 1970s, and one German assembly plant was built in 1986. While there was a mixture of new and old plants, only plant G-F can be considered a "greenfield" plant. Therefore, I will concentrate on older plants that are attempting to restructure their production to meet the demands of a more competitive market, rather than on new facilities that are starting outright with new production concepts.

It is also evident from table 3.1 that the German plants have significantly more employees. While U.S. companies throughout the 1980s and into the 1990s have been reducing their work forces and decreasing their extent of vertical integration, German companies have continued to have market success and to hire employees. From 1970 to 1988, employment within the German automobile industry grew by 26 percent, despite two oil crises and intensified international competition (Verband der Automobilindustrie [VDA] 1979, 1989).

Table 3.1 **Plant Sample Characteristics**

	United States				Germany			
Plant Type	Notation	Year Built	Product Type	Employment Level	Notation	Year Built	Product Type	Employment Level
Automobile Assembly Plant	US-A	1952	Compact	3,048	G-A	1939	Subcompact	62,000
	US-B	1965	Full-size (luxury)	3,800	G-B	1929	Compact and midsize	17,519
	US-C	1958	Midsize	5,250	G-C	1931	Subcompact and compact	25,700
					G-D	1965	Subcompact and midsize	24,567
					G-E	1917	Subcompact (luxury)	12,987
					G-F	1986	Subcompact (luxury)	3,249
Transmission Plant	US-D	1952	4-speed automatic; FWD/RWD	4,325	G-G	1958	4- and 5-speed automatic, manual; FWD/RWD	19,800
	US-E	1965	4-speed automatic; FWD	3,800				
	US-F	1955	3- and 4-speed automatic; FWD/RWD	5,000				
Engine Plant	US-G	1951	V-6, 4-cylinder; gas	2,600	G-H	1970	4-, 5-, and 6-cylinder; gas/diesel	9,857
	US-H	1971	V-8, 4.5 cylinder; gas	1,375	G-I	1956	4-cylinder; gas/diesel	6,279
	US-I	1976	V-8; gas	770				

Note: FWD = front wheel drive; RWD = rear wheel drive.

The plants surveyed are part of national industries that are enjoying different levels of market success. As mentioned above, employment in the German automobile industry has grown throughout the 1970s and 1980s. In particular, employment in the automobile industry suffered very little during the second oil crisis in 1979–80 and has grown almost steadily since that time, although the current recession in Germany has resulted in buy-offs of automobile workers. Employment in the U.S. automobile industry has been more affected by the oil shocks and business cycle, declining dramatically since the late 1970s. In addition, new car registrations in Germany increased by 25 percent from 1970 to 1988 (VDA 1979, 1989). In contrast, passenger car sales in the United States rose by only eight percent from 1970 to 1988 (Motor Vehicles Manufacturers Association [MVMA] 1990).

3.3.2 Employment Systems

In terms of the employment systems of the plants in the two countries, several general comments can be made. I found great diversity in the extent of changes in employment systems across U.S. plants. Some plants have extensively broadened job content, reduced job classifications, and instituted team production, while other plants have made no substantive changes in these areas. Although collective bargaining agreements have outlined areas of participation between local unions and plant management, a limited number of plants fully utilize these provisions. Although differences between employment system adjustments exist across German plants, they were not as extreme as differences found across the U.S. plants. The type of payment system found in German plants generally allows for more flexibility among workers than the job classification system in the United States. Working within an industrial relations system that legally provides significant job security and codetermination rights for labor representatives on issues of job structure and training, most German works council leaders have been successful in encouraging management to broaden job content in an effort to obtain higher wages. The institutional structure of the German industrial relations system has also contributed to the extensive changes in the employment systems across plants.

Table 3.2 compares the movement of plants in the United States and Germany toward more flexible employment systems. I classify the degree of change in employment system flexibility in these plants into three categories: high, moderate, and low. I also allow for distinctions between "upper" and "lower" levels within each of these three categories to indicate minor relative differences. I will later compare the degree of training in each of these plants with the degree of employment flexibility. These three categories—high, moderate, and low—are based on a qualitative assessment of changes in the plant's employment system toward increasing the breadth of job content and/or job classifications, decentralizing various functions such as maintenance tasks and management and supervisory functions, expanding the use of team production,

Table 3.2 **Plant Sample Classified by Degree of Change in Employment System Flexibility (plant type)**

Change in Employment System Flexibility	United States	Germany
High-degree		
Upper	US-I (engine)	
Lower	US-H (engine)	
Moderate-degree		
Upper	US-A (assembly)	G-A (assembly)
	US-D (transmission)	G-D (assembly)
		G-G (transmission)
		G-H (engine)
		G-I (engine)
Lower	US-B (assembly)	G-B (assembly)
		G-C (assembly)
Low-degree		
Upper	US-F (transmission)	US-E (assembly)
	US-G (engine)	US-F (assembly)
Lower	US-C (assembly)	
	US-E (transmission)	

Note: See table 3.1 for explanation of notation.

and increasing the extent of labor participation into areas of work organization, job design, quality assessment, and training. For example, plants in the high-degree category would have made extensive changes to their employment systems and perhaps have organized teams with broadly defined jobs and considerable participation of workers in various decisions. Plants in the low-degree category would have made few if any changes in their employment systems, instead maintaining more traditional organizational forms characterized by a high division of labor. Studies have shown that plants reforming human resource practices away from rigid work rules and toward greater flexibility and participation are more productive and more likely to produce higher-quality products (McDuffie and Krafcik 1990; McDuffie and Kochan 1991; Hartmann et al. 1983).

The two U.S. engine plants are placed in the high-degree category because they have made the most extensive changes of all the plants. These changes were the result of management's desire to experiment with radical organizational reform and of the willingness of local unions to accommodate to these changes out of concern for job security. These two plants are the newest of the U.S. plants and are organized completely on a team basis. Each team is responsible for the full production of an engine component or for the assembly process. Furthermore, many of the formally centralized management decisions have been decentralized to the team level. The pay systems in these plants have been changed, and participation of workers has extended beyond simply issues of quality to include who receives training, who performs certain tasks, and who is involved in other production decisions.

The plants in the moderate-degree category have made significant changes in *specific areas* to enhance organizational flexibility. This includes forming teams in certain production areas, increasing the involvement of workers in decisions about training and job design, and broadening job content or creating new positions that require a variety of skills. These changes in U.S. plants were primarily the result of management initiative and of pressure put on local unions to agree to them or face job losses. Plant US-A has made significant reductions in job classifications in its stamping area and has involved skilled and nonskilled workers in decisions about job design for new areas of the plant, while plant US-D has reduced job classifications and has created a large number of machine monitors who operate as teams in their machining area. Plant US-B is on the lower end of this category because, despite reducing job classifications, it has not broadened job content, introduced teams, or conducted effective worker participation. The German plants in the upper level of the moderate-degree category (see table 3.2) have made even more extensive strides in introducing teamwork in various areas, expanding the tasks of skilled workers, and reforming rigid pay practices. Works council participation in these plants has been significant and is a motivating force for greater organizational flexibility. Management in these plants has also been interested in making these organizational changes because they view them as a way to make more effective use of worker skills and to increase productivity. Plants G-B and G-C are in the process of making changes similar to those made in other German plants, but these changes have not yet been as vast.

Plants in the low-degree category have not broadened job content, decentralized decision making, experimented with teamwork, nor enhanced worker participation, because of distrust and conflict between management and labor representatives, because of lack of direct economic pressure to change, or because of management strategies that emphasize managerial control over worker empowerment. Plants US-C and US-E have not reduced job classifications or significantly modified work rules to allow for greater flexibility. Plant US-G is discussing changes in job classifications and team production, but at the time of the interviews no changes had occurred. Plant US-F has informally increased the tasks of certain jobs, but the local union has strongly resisted any adjustments that formally change the job structure or work rules. The two German plants in this category are the oldest and the newest in the German sample; in addition, they are part of the same company, which is primarily empowering front-line supervisors, rather than fully expanding the role of skilled workers at the point of production. Little experimentation has occurred in these plants, and the works councils have been very weak in their response to management's traditional organizational initiatives.

A general view of table 3.2 reveals that German plants are primarily clustered in the moderate category while U.S. plants are represented in all three categories, with most plants in the low category. This type of breakdown is consistent with the way the institutional environments in the two countries fa-

cilitate change. The rights of participation possessed by German works councils and the legal rights of job security possessed by workers, combined with a cohesive union movement, allow for employment-system restructuring to take place under relatively secure institutional conditions. The German industrial relations system fosters corporatist-type participation at a variety of levels and an institutionally supportive environment, in which both firms and workers have been more willing to adjust past practices toward higher overall levels of flexibility than are U.S. firms and workers.

This type of institutional environment gives German plants an advantage over plants in the United States, where this type of institutional environment is lacking. Restructuring is difficult for many U.S. plants because of a fragmented industrial relations environment. Local union members are often at odds with international union initiatives and therefore resist making changes or do not effectively use national negotiated avenues of participation. Furthermore, many significant changes to the employment systems of automobile plants are the result of management initiatives tied to threats to close plants if specific changes are not adopted. This strategy has discouraged effective worker participation in many plants. Although some U.S. plants have made extensive changes to their employment systems, the lack of favorable institutional arrangements still causes problems. As Wolfgang Streeck states, "individual firms may . . . come to be diversified quality producers even in institutionally impoverished settings. However, . . . they will remain islands ('of excellence') in a sea of more traditional production and lower production competence, and their performance will likely be less good and less stable than if they were part of a *general pattern*" (Streeck 1990, 13).

In the next section, I examine the training practices of the various plants and the hours of training offered in different areas. I will then compare the extent to which training patterns in the individual plants support their employment systems.

3.3.3 Training Practices

As discussed in section 3.2, occupational training in Germany has a greater influence on plant-level training than does U.S. occupational training. The data in table 3.3 indicate that, in general, German plants train significantly more apprentices as a percentage of total wage earners than do U.S. plants.

Plants US-G and US-I are exceptions, having a slightly larger ratio of apprentices to wage earners than the two German engine plants. Plant US-I is a new plant that is gearing up for production, and plant US-G has an older work force with a large number of workers expected to retire. Plants US-H has no apprentices, because it draws on the large number of laid-off skilled workers in the company for its skilled needs.

The emphasis of U.S. apprenticeship training on plant-specific skills is a weakness of U.S. industrial skills training. In response, U.S. plant managers have sought to modify industrial apprenticeship training through cross-training

Table 3.3 **Total Number of Apprentices in Industrial Occupations by Plant, 1988–89**

	United States		Germany	
Plant Type	Plant	Number of Apprentices	Plant	Number of Apprentices
Automobile assembly	US-A	NA	G-A	2,000 (4.3)
	US-B	40 (0.7)	G-B	557 (3.5)
	US-C	21 (0.6)	G-C	679 (3.5)
			G-D	956 (4.9)
			G-E	790 (7.4)
			G-F	161 (6.4)
Transmission	US-D	57 (1.4)	G-G	964 (5.5)
	US-E	23 (0.6)		
	US-F	53 (1.2)		
Engine	US-G	16 (2.6)	G-H	182 (2.1)
	US-H	0	G-I	140 (2.4)
	US-I	55 (2.8)		

Note: NA = data not available; number of apprentices as a percentage of number of wage earners in parentheses.

measures. Cross-training broadens the job tasks of skilled workers by incorporating the incidental work of other trades into workers' own trades; more extensive cross-training can even create new, more broadly defined occupations. Although management in all plants expressed a desire to cross-train skilled workers in related trades, as a means of both increasing the flexibility of the skilled workers and reducing the size of the work force, little change has occurred in the content or structure of apprenticeship training. Unions resist such changes to apprenticeship training because of the negative effects these changes would have on employment and on the unions' tradition of job control.

Only one U.S. plant (US-B) is conducting extensive cross-training. It is essentially carrying out apprenticeship reform by creating new occupations that are broadly defined by are not recognized outside that particular plant. The local union offered little resistance when management redefined the skilled occupations in the plant. The reforms are combining 13 trades into 7 trades, in which each skilled worker receives an average of 800–900 additional hours of training over seven years. The local union agreed to the changes to preserve jobs, despite the fact that the cross-training is taking place without formal UAW approval. The local union president at plant US-B said that he would prefer strong lines of demarcations between jobs and was reluctant to allow formal cross-training of skilled workers but noted that he felt the union had no choice but to agree to the changes in order to secure jobs.

Given the absence of national or regional coordinating bodies or any action through collective bargaining, employers have responded by working through individual plants to get local unions to accept changes in apprenticeship training in order to save jobs. These local initiatives, however, do not address the

overall inability of the occupational training system to support general skills training at the plant level; moreover, they are likely to lead to even greater quality differences between plants.

In terms of plant-level further training, its composition across the two countries reflects the role of occupational training within the firm and the bargaining between labor and management representatives over training issues. In general, U.S. plants have increased general training of workers in basic skills in many areas of the plant, through the nickel fund. German plants have worked through national corporatist bodies to make occupational training more flexible; in addition, plant-level further training in Germany focuses on specific groups of workers and builds on the broad, initial occupational skills acquired during the apprenticeship.

Rather than simply comparing the aggregate number of hours of training offered to workers in the various plants, I examine the hours offered of certain types of training and assess qualitative differences in training across the two countries. I have divided training programs into the following three categories to facilitate comparison. (1) Product and process awareness training: These are programs designed to better inform the work force about the product or the process in which they work. (2) Teamwork-plus training: These programs teach communication skills, problem solving skills such as statistical process control, math skills, and team training. (3) Technical training: These programs consist of specific courses primarily for skilled and certain nonskilled workers; they are conducted by equipment vendors or the plant training staff. Product and process awareness training is distinguished because of its widespread use and its emphasis on information rather than skill development. Teamwork-plus training focuses on the social and analytical skills demanded by new forms of work organization, and the technical training category captures the effect of new technology and the demand for technical skills.

Product and process awareness training. This awareness training is conducted on company time and is targeted at specific groups of workers. Table 3.4 shows the hours of training offered in product and process awareness for U.S. and German plants by job group.[4] The purpose of these training programs is to show employees how the product, or at least their part of the final product, is put together and to show them the importance of their job in determining the quality of the final product. The word "training" is used loosely here; although certain knowledge is passed on to the employees through awareness training, the primary function of such a program is to communicate information rather than increase skills.

Both transmission plants and engine plants in the United States appear to

4. The hours of training offered by each plant is used to measure the composition of training in each plant. These hours include some of the actual training conducted in the plants during 1988–89; however, detailed breakdowns of how much training each job group actually received was unavailable.

Table 3.4 **Product and Process Awareness Training: Hours of Training Offered on Paid Time to Nonskilled and Skilled Workers, 1988–89**

	United States			Germany		
Change in Employment System Flexibility	Plant (type)	Training Offered		Plant (type)	Training Offered	
		Nonskilled	Skilled		Nonskilled	Skilled
High-degree	US-I (engine)	56	56			
	US-H (engine)	40	NA			
Moderate-degree	US-A (assembly)	0	0	G-A (assembly)	28[a]	28[a]
	US-D (transmission)	4 or 44	NA	G-D (assembly)	0	0
	US-B (assembly)	24	24	G-G (transmission)	40[a]	40[a]
				G-H (engine)	Offered	0
				G-I (engine)	0	0
				G-B (assembly)	0	0
				G-C (assembly)	0	0
Low-degree	US-F (transmission)	Offered	0	G-E (assembly)	0	0
	US-G (engine)	10	10	G-F (assembly)	Offered	Offered
	US-C (assembly)	Offered[a]	0			
	US-E (transmission)	48	48			

Note: Offered = training offered but hours unknown; NA = data not available.

[a] Training offered to a select group only.

engage in awareness training to a greater extent than automobile assembly plants. Perhaps this is true because the transmission and engine plants are smaller and have fewer area divisions. Assembly plants, because of their large areas (assembly, trim, chassis, body, and paint), may feel it is better to orient workers to a new product by area rather than by using a general program for the whole work force. Furthermore, plants US-A and US-C use quality deployment sheets rather than a general program to orient workers to the new product. These sheets outline the operators' job tasks and allow them to alter their tasks in ways that may improve quality and/or efficiency.

The area of the plant where one works also has an effect on the hours of product awareness training one receives. In plant US-D, assembly workers received only 4 hours of training, while workers in the machining area received 44 hours of training. This reflects differences in the jobs in the two areas but also shows the emphasis plant management places on certain types of training. Whereas plant US-E offers a significant amount of product awareness training to all job groups, plant US-D emphasizes other areas of training, such as group interaction skills and technical skills. Local unions view product and process awareness as positive. It was the intent of the nickel fund to encourage such training, and most local unions would like to see more of this training conducted.

In German plants, integrating skilled workers into production areas brings not only highly qualified workers into the production department but also workers who, through their initial apprenticeship training, have an understanding of product quality and knowledge of the overall production scheme. Thus, there is a feeling that such product and process awareness courses are not necessary, which would presumably reduce labor costs for German plants. This training has appeared in German plants, however, because of the initiatives of works councils linking this type of training to a major change in the organization of work. As table 3.4 indicates, German plants offer less product and process awareness training to both nonskilled and skilled workers than do U.S. plants.

Furthermore, awareness training programs in German plants are specific programs designed for a select group of workers in a newly organized area of production, rather than broad programs designed to inform or instill a work ethic in the work force. Plant G-A, for example, is offering process awareness training in a small group of workers in plastic bumper production, which is organized in work groups. In plant G-H, a proposal to institute group work in the engine-casing production area included an engine, technology, and quality awareness course for nonskilled workers. Efforts are also being made to expand this to the assembly area. In plant G-G, only those workers trained as system operators receive product and process training. Although system operators are generally skilled workers, plant G-G further trains a large number of nonskilled workers into this position. This is done because the plant has reorganized rapidly and it needs more system operators than it has skilled workers.

In addition, the plant has an agreement with the IG Metall to further train nonskilled workers.

Teamwork-plus training. The hours of teamwork-plus training offered at the U.S. and German plants surveyed are presented in table 3.5. The primary function of this type of training is to enhance the communication between job groups in the plant by providing common methods to describe and solve problems, although this training is also used to enhance the effectiveness of quality circles or teams. Statistical process control (SPC) and math skills, as well as step-by-step problem-solving procedures, are the most commonly offered forms of this training.

The data in table 3.5 indicates that, in the United States, transmission and engine plants offer more of this type of training than automobile assembly plants. Large assembly operations usually train a select group of workers to be SPC coordinators. While operators may receive general SPC awareness training, only coordinators receive extensive training and conduct periodic inspections of parts. Transmission and engine plants tend to give all operators more extensive SPC training, especially plants US-D, US-H, and US-I.

Plant US-C has pursued a different strategy with regard to teamwork-plus training. The formal employee involvement program was eliminated at this plant because of union resistance and because of misuse by some supervisors, who used information gathered from employees to eliminate their jobs. As a result, no formal teamwork-plus training is conducted for the hourly work force. The plant management has instead invested significant resources and time in training front-line supervisors in these skills. These supervisors are trying to impart these skills informally to their particular work areas. It is too early to tell how effective this strategy will be.

Among the U.S. transmission plants, US-D offers the most extensive training to all nonskilled operators. Of the 116 hours of training offered, 76 hours of training are in SPC, math skills, and problem-solving skills; the remaining 40 hours of training consist of a voluntary team training program with skilled and supervisory personnel. This stands in contrast to plant US-F, where group interaction training is offered but only to operators in the new product area.

Engine plants US-H and US-I, which are run on a teamwork basis, conduct significant training in group interaction for all employees. This type of training is used as the foundation of the teamwork approach, which relies on communication between job groups and on group problem solving. In the assembly plants, little teamwork-plus training is offered, indicating that the job requirements of assembly workers have not changed enough to justify broad training beyond communication skills and greater product awareness.

Management strategy also contributes to the amount of teamwork-plus training a worker receives. Plant US-D, for example, provides significant training of this type to all nonskilled operators because management believes that operators should be trained in skills beyond the needs of their current jobs. Further-

Table 3.5 **Teamwork-Plus Training: Hours of Training Offered on Paid Time to Nonskilled and Skilled Workers, 1988–89**

Change in Employment System Flexibility	United States			Germany		
		Training Offered			Training Offered	
	Plant (type)	Nonskilled	Skilled	Plant (type)	Nonskilled	Skilled
High degree	US-I (engine)	66	66			
	US-H (engine)	48	48			
Moderate degree	US-A (assembly)	Offered	Offered	G-A (assembly)	43[a]	43[a]
	US-D (transmission)	116	40	G-D (assembly)	40[a]	56[a]
	US-B (assembly)	12	12	G-G (transmission)	32	54
				G-H (engine)	56[a]	0
				G-I (engine)	44[a]	48[a]
				G-B (assembly)	24	24
				G-C (assembly)	20	20
Low degree	US-F (transmission)	Offered[a]	Offered[a]	G-D (assembly)	0	0
	US-G (engine)	40	NA	G-F (assembly)	0	0
	US-C (assembly)	0	0			
	US-E (transmission)	40	NA			

Note: Offered = training offered but hours unknown; NA = data not available.

[a]Training offered to a select group only.

more, some plants (US-D, US-E, and US-G) offer less group interaction training to skilled workers than to nonskilled workers or simply offer the skilled workers no training of this type. Skilled workers in these plants are perceived to already possess the appropriate knowledge to communicate with other groups in the plant, and thus this training is considered redundant. Other plants (US-B, US-H, and US-I) offer the same amount of training to nonskilled and skilled workers. This uniformity reflects a management strategy which seeks to give all job groups an equal understanding of effective communication and problem-solving strategies. This also reflects union efforts to ensure access to general training for all workers.

The specific teamwork-plus training programs in German plants consist of problem-solving training (or diagnostic training), SPC training, quality training, and communication training. As in the United States, the integration of inspection into the production area has brought about training for a select group of workers in areas where these skills are most needed. In general, German plants concentrate on diagnostic and SPC training and, to a lesser degree, on communication and product quality training. The diagnostic and SPC training is geared toward skilled workers or nonskilled workers in high-skill positions, such as the system operator. The training is more sophisticated than the broad problem solving or basic SPC that U.S. plants provide. German plants target this type of training toward highly skilled workers in automated areas, rather than providing general training to a large portion of the nonskilled work force.

Group-building and communication training are underdeveloped in German plants. Only plant G-D offers formal group-building training to its skilled and nonskilled workers in its automated body-welding areas. These workers consist mostly of skilled workers or system operators. Both plants G-E and G-F offer no teamwork-plus training to their workers; the plants are organized in a traditional manner and only recently has quality control been integrated into their production areas. Training in communication skills and team training is given to supervisory personnel.

To summarize, product and process awareness training and teamwork-plus training in U.S. plants represent general training programs supported by the nickel fund and its administrative structure. This training is designed to give a large number of workers basic general skills and to improve their attention to quality. In German plants, product awareness training is designed for specific groups of workers who are in areas of the plant undergoing reorganization. Teamwork-plus training is designed for workers in highly skilled jobs and is intended to increase their ability to diagnose and solve complex problems. While German plants continue to focus on technical or diagnostic training for high-skill jobs, works councils have been advocating greater use of teamwork-plus and product awareness training, in conjunction with their proposals for group work.

Technical training. The number of hours of technical training offered at U.S. and German plants sorted by job group are presented in table 3.6.[5] Technical training includes courses on plant equipment and equipment programming, troubleshooting, robotics, computer training, and vendor training on specific equipment. This is very specific training centered on a piece of equipment or a process.

In U.S. plants, the amount of technical training offered to nonskilled workers is influenced primarily by management strategy. New forms of work organization, such as teamwork, and the creation of more demanding jobs in the nonskilled area, as well as the broadening of job tasks, have increased the amount of technical training for certain nonskilled workers. In the two plants organized by teams (US-H and US-I), nonskilled workers receive some of the highest amounts of training across the plants. The 120 hours of technical training in plant US-H is provided to operators in the machining area, while plant US-I offers 281 hours to all nonskilled workers. In plant US-D, 188 hours of the 208 hours provided to nonskilled workers is directed toward manufacturing technicians. The remaining 20 hours is geared toward operators who work with robots in the machining area. The remaining plants provide training to job setters or, in the case of plant US-G, to operators on the transfer line of the latest product. The complexity of new equipment has demanded that operators in these areas also receive training. Notably absent from the technical training roster are operators in the assembly area. These jobs remain very manual and have not been reorganized to require extensive technical training.

As seen in table 3.6, U.S. skilled workers receive more technical training than nonskilled workers, but within the skilled ranks some trades receive more training than others. Electricians tend to receive the most training of all the industrial trades. In plant US-A, for example, 51.3 percent of all the hours of technical training offered to the skilled trades is for electricians. In plant US-E, this figure is 42 percent.

The variance between U.S. plants in the training offered to skilled workers reflects the extent to which ongoing technical training has been developed at the plant level. Some plants have created extensive courses utilizing their training staff and equipment vendors, while other plants are less organized or have concentrated training mainly around the launch of new products.

In Germany, skilled workers are also the primary recipients of technical training. Although some technical training is offered to nonskilled workers, it is offered only to a very small percentage of this work force. Typically those nonskilled workers in areas of the plant undergoing organizational change or

5. The hours of training offered were calculated by adding up the total number of technical training hours per course at the time of the interviews (in 1989). Only the training hours at plant US-B are based on the year 1988. The hours of training offered will be affected by the plant's position in its product cycle and the introduction of new technology. Plants US-A, US-G, and US-I were launching new products at the time of the interviews, and much of their training reflects the need to educate workers in the new technology.

Table 3.6 **Technical Training: Hours of Training Offered on Paid Time to Nonskilled and Skilled Workers, 1988–89**

Change in Employment System Flexibility	United States			Germany		
		Training Offered			Training Offered	
	Plant (type)	Nonskilled	Skilled	Plant (type)	Nonskilled	Skilled
High degree	US-I (engine)	281	649			
	US-H (engine)	120[a]	160			
Moderate degree	US-A (assembly)	80[a]	848	G-A (assembly)	77–618[a]	1,840
	US-D (transmission)	208[a]	326[b]	G-D (assembly)	268[a]	684
	US-B (assembly)	80[a]	1,325[c]	G-G (transmission)	416[a]	856
				G-H (engine)	560[a]	656
				G-I (engine)	0	1720
				G-B (assembly)	120[a]	1720
				G-C (assembly)	NA	NA
Low degree	US-F (transmission)	Offered[a]	Offered	G-E (assembly)	0	400
	US-G (engine)	77[a]	508[b]	G-F (assembly)	0	570
	US-C (assembly)	Offered[a]	Offered			
	US-E (transmission)	64	1,259			

Note: Offered = training offered but hours unknown; NA = data not available.

[a]Training offered to a select group only.

[b]Estimate based on available data.

[c]Of the 1,325 hours, 1,245 represents the average amount of cross-training conducted for all skilled trades in 1989.

areas receiving new technology will be given some amount of technical training. German nonskilled workers receive significantly more training of this type than U.S. nonskilled workers. The works councils in German plants play a key role in ensuring that some nonskilled workers have access to technical training. Management clearly would like to further train only skilled workers; however, works councils in most plants are able to codetermine which workers receive training and thus ensure the inclusion of some nonskilled workers in further technical training.

While there do not appear to be great differences between the United States and Germany in hours of skilled technical training, the technical training German skilled workers receive is more sophisticated and ongoing rather than concentrated around the launch of new products. This reflects the extensive initial-skills training they receive during their apprenticeship and the fact that skilled workers in Germany are expected to utilize their understanding of the theoretical foundations of the production equipment and the overall process of production. U.S. skilled workers, on the contrary, are given very specific jobs and receive narrow theoretical training. In many cases, skilled workers at U.S. plants are ill-equipped to repair complicated, computerized equipment. Production managers in several plants reported that engineers had to spend "too much time" training skilled workers to repair the equipment. Furthermore, some plants simply require equipment vendors to repair equipment up to a year or more after installation. This reflects quality deficiencies in the apprenticeship training and narrow use of U.S. skilled workers.

3.4 Linking Training Practices with Employment Systems

3.4.1 Comparisons within Countries

A reexamination of tables 3.4, 3.5, and 3.6 indicates that greater hours of training are associated with movement toward more flexible employment systems. Plants US-H and US-I, in the high-degree category, support their employment systems with relatively long hours of training, especially product and process awareness training and teamwork-plus training. The hours of technical training are less clear; although the amount of technical training offered to skilled workers is not among the highest of U.S. plants, the amount of training offered to nonskilled workers is relatively high. This involvement of traditionally nonskilled workers in the training process is indicative of more flexible human resource structures and employment systems.

U.S. plants in the moderate-degree category also reveal an association between training hours offered and greater flexibility in the employment system. Plant US-D offers relatively long hours of product and process awareness training, as well as of teamwork-plus training. While technical training offered to skilled workers is comparatively low, selected nonskilled workers are receiving a comparatively large number of hours. The large number of hours of technical

training offered by plant US-B reflects the amount of cross-training being conducted, while the hours of product and process awareness training and teamwork-plus training are more moderate. Plant US-A does not fit the pattern of the other two U.S. plants in this category. The hours of product and process awareness training and teamwork-plus training is very low. You may recall that this plant dealt with process awareness on an individual basis, through quality deployment sheets. In terms of technical training, skilled workers are offered a relatively high number of hours, while certain nonskilled workers receive a moderate number. Although plant US-A was establishing, at the time of the interviews, a new stamping facility organized around a few broad job classifications and involving labor representatives in work organization decisions, their training efforts are focused primarily on technical skills rather than social and analytical skills.

Among the German plants, those in the moderate-degree category offer most of the product and process awareness training, all the teamwork-plus training, and by far the most hours of technical training, both to skilled and nonskilled workers. Plants G-E and G-F, in the low-degree category, offer virtually no product and process awareness training or teamwork-plus training; furthermore, the technical training offered by these plants goes exclusively to skilled workers.

Finally, among all the U.S. plants, those in the low-degree category tend to offer the least amount of training in all three areas. The one clear exception to this is plant US-E. Relative to other U.S. plants, US-E offers a very high amount of product and process awareness training and a moderate amount of teamwork-plus training. Given the very traditional nature of its employment system, the number of hours offered by plant US-E seem unusually high. They represent, however, a well-organized training department that is using these types of training as a means to change the ideology of the work force, making them more quality conscious and aware of the importance of their job to the whole production process. The traditional nature of the employment system in plant US-E is better seen in the hours of technical training offered. A high number of hours are offered to skilled workers, but nonskilled workers are offered comparatively few hours of training.

3.4.2 Comparisons across Countries

While more hours of training are associated with movement toward more flexible employment systems in both U.S. and German plants, hours of training alone do not fully explain the ability of firms to achieve a high overall level of employment system flexibility. Comparative analysis reveals that the occupational training system and the industrial relations institutions have important roles to play in this process. In Germany, these institutions create an environment that encourages greater organizational flexibility. The German enterprise-based occupational training system provides broad, general skills training that is more sophisticated than the narrow firm-specific skills provided in the U.S.

apprenticeship system. The "skill capacity" generated by the German occupational training system, combined with the use of skilled workers throughout the production process, is at the heart of the flexibility of German plants. The occupational training system also accounts for differences in training strategies across countries. Given the skills generated by the occupational training system, German managers perceive less of a need for product and process awareness training and some forms of teamwork-plus training. In addition, the German industrial relations system, with strong industrial unions and workplace codetermination, has been an instrumental force in encouraging work reorganization and training. Works councils have been particularly successful in including more hours of training in initiatives to expand organizational flexibility.

This supportive institutional environment is lacking in the United States. The focus of the industrial apprenticeship training system on firm-specific skills does not generate a broadly trained work force. The job content for skilled workers remains primarily unchanged. Efforts have been focused on increasing the tasks of nonskilled workers, but these workers are neither trained to nor allowed to perform complicated maintenance tasks and thus have limited flexibility. Collective bargaining has provided joint training funds for basic skill training and established a structure for labor and management participation on training issues, but the use of these funds and the success of participation has been mixed across the U.S. plants. The industrial relations institutions have not been effective in encouraging widespread movement toward greater employment system flexibility. The use of threats by management to obtain concessions from local unions has not helped the process of participation. In addition, the general lack of initiative by local unions to put forth their own proposals regarding work reorganization has discouraged more extensive flexibility in U.S. plants.

3.5 Conclusion

Although automobile firms can pursue a variety of strategies in response to intensifying international competition, employment system flexibility remains a fundamental component of diversified quality production. Automobile companies in the United States and Germany are in fact pursuing more flexible employment systems in response to competitive pressure, but the extent of changes in the organization of work and the requirements of workers differ between the two countries. In Germany, auto plants have concentrated on broadening the job content of their skilled workers by combining maintenance and production tasks and by increasing the importance of machine monitoring, troubleshooting, and programming tasks. In U.S. plants, formal demarcations between maintenance and production work remain.

Training practices in both countries have responded to new forms of organization, new technology, and new job requirements, albeit in different ways and to different degrees. While greater hours of training are associated with more

flexible employment systems, the most striking contrast between the two countries is the qualitative differences in the training offered to workers. German plants offer more sophisticated training to their skilled workers, and German teamwork-plus training tends to be more complex than that offered to U.S. workers. Furthermore, the German occupational training system generates a broadly trained work force able to take on responsibility and perform a variety of tasks. Rather than limiting the flexibility of firms, national occupational training standards establish a common ground of skills that firms build on with their own further training.

U.S. automobile plants have increased the amount of basic general skills training through the allocation of joint training funds. However, it is unlikely that these training measures will be able to create the skill capacity and environment necessary to foster more flexible employment systems. An occupational training system that continues to promote firm-specific skills and divided industrial relations institutions make restructuring employment systems much more difficult for U.S. plants. Where restructuring does take place, training must be an essential element. However, simply increasing the hours of training is not necessarily enough. As the German cases have shown, institutions, such as the occupational training system and the industrial relations system, play important roles in creating an environment that facilitates organizational flexibility. Competitive success for the U.S. auto industry, and stable employment for its workers, will not come simply from a reorganization of jobs, nonrestrictive work rules, or additional hours of training. Rather success and stability require a fundamental restructuring of training institutions in such a way as to provide a secure environment that encourages ongoing broad, general skills training and supports flexible employment systems.

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