

Negotiating the NEW GERMANY

Can Social Partnership Survive?

edited by

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8 • The Limits of German Manufacturing Flexibility

Gary Herrigel

Renewed competitiveness of small and medium-sized producers, timely decentralization on the part of large producers, and a robust infrastructure for supporting decentralized flexible production contributed to a very heady atmosphere within many German industrial regions during the later half of the 1980s. The southwest province of Baden-Württemberg in particular was heralded within Germany as a *Musterländle* (a model or showpiece state) and was widely admired throughout Europe and North America for its dynamic, high-quality producers and its effective industrial policy (Cooke and Morgan 1990a, 1990b; Funck and Becher 1994; Semlinger 1993; Hassink 1992; Herrigel 1993). Moreover, at a time when it seemed that things could not get much better, the Berlin Wall fell and Germany was unified, giving a new boost to the business cycle and longer life to the already very extended boom. As the 1990s began, it truly appeared that Germany, and in particular Baden-Württemberg, had hit upon the secret for enduring competitive success in a turbulent, rapidly changing international market environment (Katzenstein 1989; Simon 1992). This impression did not last long. By 1992 the German economy had

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fallen into the deepest recession of the entire postwar period, and the *Musterlände* Baden-Württemberg was by no means spared (Heilemann 1993; Isaak 1992; Association 1992; Atkinson 1994). Indeed, in 1991, the GDP growth rate in Baden-Württemberg (2.8 percent) fell beneath the Federal average of 3.4 percent for the first time since 1978, placing it behind all other western German provinces except the Rheinland-Pfalz. Investment rates and job growth, especially in investment goods, fell off dramatically: the total number of jobs in the Baden-Württemberg investment goods industries fell by 11.4 percent between 1991 and 1993. Large and small firms in a variety of sectors, especially machinery, auto, and electronics, announced sometimes dauntingly large losses and layoffs. Daimler Benz, for example, announced in 1992 that it planned to lay off 29,000 workers and engage in massive internal restructuring. Berthold Leibinger, a prominent machine tool industry executive, was so alarmed by the dramatic downturn in orders for German machine tools in 1993 that he predicted that nearly half of the industry's jobs would have to be cut by mid decade (Iwer 1994; Engelmann et al. 1994; Cooke, Morgan, and Price 1993; Cooke 1994).¹ Bankruptcies (both personal and business) increased dramatically in the Federal Republic during this period. From a low of 12,437 in 1990 totaling DM 6.82 billion, the number of bankruptcies increased to 19,264 in 1993, totaling some DM 29.03 billion (*Industrie-und Handelskammer* 1994, 14).

Most interesting about this recession is that virtually no one in Baden-Württemberg believed that it was simply a cyclical downturn. On the contrary, most observers clearly understood the recession to be some kind of structural crisis, and there was nearly universal agreement on its primary symptoms. For example, both the elite, heavily business dominated *Zukunftskommission*² which was appointed by the government of Baden-Württemberg to study the economic problems of the region, and a study by the IMU Institute commissioned by IG Metall traced the crisis to the incapacity of regional producers to keep pace with increasing international competition. Relative to their main competitors in Japan, the rest of the Pacific Rim, and North America, the two studies agreed that Baden-Württemberg producers, large and small, had the following failings:

1. They brought new products to market more slowly than their foreign rivals.
2. They had more difficulty continuously and quickly integrating new technologies into their products.

1. Iwer (1994) points out that average annual rates of job growth fell even more precipitously in the narrower Stuttgart/Böblingen region. Investment goods industries had 15.5 percent fewer jobs in 1993 than they did in 1991.

2. *Zukunftskommission* can be translated as "Commission for the Future."

3. They had a tendency to "overengineer" their products.
4. They are unable to lower their production costs into competitive ranges.

Both parties further agreed that producers had become overly rigid and bureaucratic (Iwer 1994, esp. 50–59, 66–82; Zukunftskommission 1993). Finally, though both groups were writing about Baden-Württemberg, both indicated that the problems they identified applied to German manufacturing as a whole.³

Despite this surface consensus on the symptoms of the crisis, fundamental disagreements existed between the parties regarding its underlying causes and possible remedies. The Zukunftskommission, which represented government and management, claimed that the decisive problem for German competitiveness was the high comparative level of German production costs and in particular wage costs. Labor and academics sympathetic to labor, on the other hand, claimed that the real problem lay not in wages but in the failure of government and management to raise productivity and engineer a shift within the economy to more modern and growth-intensive industries and technologies, such as information technology, biotechnology, new materials technologies, and energy, aerospace, and environmental technologies (Naschold 1994; Iwer 1994). In short, each wanted to shift the blame and ultimately the burden of adjustment onto the other.

As politically weighty as each of these positions may be, neither is altogether satisfactory. Though it is true that German wages are higher than those of most of their major competitors, the gap is moderate and, moreover, has not changed appreciably from the 1980s when German competitiveness was being celebrated (Iwer 1994, 30–43). Likewise, German productivity levels have always been out of line with many of their foreign competitors in many sectors, largely because traditionally Germans have very successfully emphasized the production of lower-series, high-quality niche products that their international competitors did not or could not produce. The manufacture of such products has always been cost-intensive and has always resisted productivity-enhancing rationalization. The difference now is that the distinction between a niche product and a volume product has begun to collapse, and Germany's competitors have been able to maintain their higher levels of productivity while entering German high-quality markets (Naschold 1994). This, moreover, has nothing to do with a

3. Indeed, the Zukunftskommission solicited members from all over Germany, not just Baden-Württemberg. The IMU study was sponsored by IG Metall, which obviously regards events in Baden-Württemberg, its strongest and most prosperous district, as crucial for developments elsewhere in the Federal Republic.

failure by German manufacturers to enter new "growth" markets: Germany's competitors are gaining market share in traditional German markets such as machine tools and automobiles! Nor is the problem simply that the German employers have been unable to maintain levels of productivity. Rather, it is that German manufacturers cannot compete in world markets using the market strategies and production practices that have made them successful in the past.

AN ALTERNATIVE VIEW

I suggest that the current crisis afflicting German producers stems from the fact that their international competitors are better and more flexibly organized than they are. Adapting to and adopting some or all of the features of these new forms of organization will involve a profound restructuring of at least two of the fundamental characteristics of German industrial practice: the central structuring role of skill distinctions within German workplaces, and the divisions between functions within the managerial structures of German firms. Reforming these dimensions of the German industrial order will force the Germans to reconsider the adequacy of institutional solutions to labor and product-market processes that have been in place for much of the current century and, moreover, which have long been considered to be sources of Germany's competitive strength in world markets.

The current crisis in German manufacturing, in other words, cannot be resolved by shunting the burden of adjustment onto either labor or management. Instead, successful adjustment will have to involve the collective reconsideration of the institutional mechanisms that define and regulate relations among *all* parties in labor and product markets. Crises are moments of collective self-redefinition in which the order of relations, roles, and institutions in social life is recomposed: The current crisis in German manufacturing is provoking a set of debates and experiments that aim at nothing less than the reconception of the actors within and the boundaries of industrial practice in the German political economy.

A general argument about industrial transformation in Germany through a close analysis of the experience of producers in Baden-Württemberg may appear paradoxical to those familiar with the arguments for the peculiarity of Baden-Württemberg's industrial structure during the 1980s, but the paradox is easily clarified: the significance of Baden-Württemberg during the 1980s largely had to do with the striking success of its dense networks of small and medium-sized firms. Baden-Württemberg was constructed in public debate as an industrial district and contrasted with the competitive and

organizational strategies of larger-scale firms elsewhere in Germany (and, indeed, within Baden-Württemberg itself)(see e.g. Herrigel 1989).⁴

Currently, however, both large-scale producers and the dense networks of small and medium-sized producers are suffering competitive decline in international markets. Thus it is at least plausible that the problems that large and small firms have in common stem from their similarities, not their differences. Baden-Württemberg, unlike many other German regions, has important concentrations of both large-scale and decentralized small and medium-sized producers; thus close analysis of the experience of producers there can be taken to be characteristic of the experience of producers throughout the German Federal Republic.

THE CASES OF AUTOMOBILES AND MACHINE TOOLS

The experiences of the machine tool and the automobile industries are typical of what has happened to flexible decentralized production in Baden-Württemberg in the 1990s. In both cases, the traditional strategy for success had been to aim for the high-quality segments of markets for particular technologies or products and attempt to narrow (or, as in the case of Mercedes Benz, manage) the price gap between their higher-quality goods and the standardized variants produced by their competitors. This strategy was made possible by a unique array of social roles, political and economic practices, and institutional mechanisms that shaped and regulated labor and product markets among producers in the region:

1. In general there were relatively high levels of skilled labor in production.
2. Significant dimensions of the specialty production processes utilized craft or batch production organizational principles and not mass production ones.
3. Among industrial workers and managers in the region, in large and small firms, there existed a strong social norm according social honor to the successful performance of a *Beruf* or skilled vocation.
4. Relations among producers were constituted vertically through extensive and collaborative subcontracting relations and horizontally through long-standing arrangements for the stabilization of competition and the coordination of specialization.

4. Indeed, much of the debate about Baden-Württemberg during the 1980s involved whether or not this claim was true—or at least to what degree it was true relative to other German regions. For important dissenting views see Cooke and Morgan 1990a and 1990b.

5. Finally, many costs and risks that especially smaller and medium-sized producers encountered were socialized across a supportive exoskeleton of institutions for technology transfer, vocational training, export promotion, market stabilization, and so on.

This system of industrial order in southwest Germany relied on quality and customer satisfaction to compensate for what were traditionally considered to be, given the way they were produced, the *invariably* higher costs of the products it manufactured.⁵

The Achilles' heel of this strategy and possibly of the entire supportive social economy, it now appears, was that it depended on the existence of a relatively stable space in markets for higher quality and/or customized products that were more expensive than standard variants. This space seems to have disappeared, not because consumers are no longer interested in high quality and customization but because a whole host of producers in these industries, particularly in Japan and the United States (though not only there), have adopted production methods that enable them to supply this demand at a much lower price than the Germans can. Moreover, these competitors can do this while driving the pace of innovation to levels even the historically highly innovative Germans are not accustomed to (see e.g. Schumann et al. 1994).⁶

The key advantage the new alternative production methods have over the traditional German-form of decentralized industrial order is that they organize production in ways that break down boundaries not only *between* firms, as the decentralized Germans have done, but *within* firms as well. Extremely flexible organizational forms have emerged, in different ways in different countries, which bring together production, purchasing, sales, development, and often suppliers, to cooperate in the "simultaneous engineering" of products. These changes have been accompanied by and are integrated with the broad diffusion of group or team work in direct production, modular production, U-shaped production lines, and the institution of zero-defect and continuous-improvement policies managed by teams them-

5. For an elaboration of the concept of industrial order in the Baden-Württemberg context, see Herrigel 1993 and Sabel et al. 1989.

6. It is important to emphasize that these "new production methods" cannot be identified with all the practices of all the producers in a particular country—such as Japan or the United States. As the world and European economies become more integrated and national boundaries become less significant, best practice in manufacturing is increasingly located everywhere and nowhere. Examples of highly successful new style flexible production can be found all over the advanced industrial world (even, as we shall see, in Germany). Producers in different national and regional environments implement the new methods in distinctive ways, and they encounter distinctive obstacles to adaptation and adoption. The focus here is on the German chapter of this story.

selves. All of this is organized around and enforced by the maintenance of extremely low inventories throughout the production process (Shingo 1987, 1992; Nishigushi 1992; Koike and Takenori 1987; Womack et al. 1990; Aoki 1988; Rommel et al. 1995).

Such systems attempt to orient the entire process chain in production, from development and design to final assembly, around the needs and desires of the customer. The key to the system's tremendous flexibility is that it reunites the conceptual development of product and production design with their actual manufacture within production units by removing all fixed roles in the workplace. The product teams define and allocate specific tasks of design and manufacture through the process of development and production itself. The key to the system's remarkable innovativeness rests in the close and continuous self-monitoring practices that the new product teams engage in under conditions of extremely low inventory. Because buffers are extremely small, each position in the production process has an incentive to get information about and communicate with the entire set of positions in the process to optimize flow and avoid bottlenecks. This structure engenders continuous discussion within and among product teams about the organization of production and the nature of the product. At its limit, the logic of this alternative system causes the old style "firm" to disintegrate entirely into an infinitely recombinable set of roles and relations that the participants themselves continuously define and structure (Sabel 1994).⁷

Experience in direct competition has proven the superiority of these alternative methods over the traditional German forms of decentralized flexible high-quality production. The significance of the growth in popularity of Toyota's *Lexus* and Nissan's *Infiniti*, for example, has been widely appreciated as a threat to German luxury automobile producers. Without (at least the perception of) any drop in quality, Nissan and especially Toyota, using the alternative production methods, managed to produce luxury cars much more cheaply than Daimler Benz and quickly captured a very large section of the American luxury market during the latter half of the 1980s. By the early 1990s, the Japanese had begun to invade European markets.

If there had been any doubt at Daimler Benz that the production methods deployed by the Japanese were superior to those in its own factories, these doubts were dispelled when it was revealed that their main assembly plant in Sindelfingen was the notorious "anonymous high quality but low produc-

7. I am not suggesting that the system described here in the text exists anywhere in the full form outlined in the text, or that it must be adopted in the same way in all places. On the contrary! But it is the case that the principles mentioned in the text are at the center of debate worldwide about the reorganization of production. For a discussion of the diffusion of these principles, with examples taken from throughout the advanced industrial world, especially Japan and the United States, see Sabel 1995.

tivity European plant" in the MIT Automobile Project's famous study of the world automobile industry, *The Machine That Changed the World* (Womack, Jones, and Roos 1990, 91; Cooke, Morgan, and Price 1993). According to the MIT report, this plant was "expending more effort to fix problems it had just created than the Japanese plant required to make a perfectly new car the first time."⁸ Daimler Benz itself estimated in 1993 that its production costs were roughly 35 percent higher than those of its main competitors in Japan. In that same year, the company announced a record DM 1.8 billion net loss (Morgan 1994).

The competitive disadvantages of the decentralized German craft manufacturing system relative to the more flexible and lower cost system being adopted by the best of their major competitors is if anything even clearer in the case of the machine tool industry. Here too, the Germans performed badly relative to the Japanese and rejuvenated U.S. producers during the 1990s (Finegold et al. 1994; Schumann et al. 1994, 371-528, esp 406f). Here as in automotive sector, high German production costs and the high quality, greater flexibility, and relentless innovation of competitors have been to blame. Producers of high-quality standardized computer-guided tools, such as Traub Maschinenfabrik of Reichenbach/Fils and the Index-Werke of Eßlingen, have been radically outproduced by Asian, especially Japanese producers. The Japanese have been able to match the quality of the German machines at a much better price and with better service and delivery conditions (Schumann et al. 1994, 404-5). At the high end of lower-volume specialty machines, German producers are being squeezed on the one hand by the ever improving quality and flexibility of Japanese standard machines, which can be used in more and more areas formerly accessible only to specialized machinery, and on the other, by resurgent American producers (Finegold et al. 1994; USDC 1994).

The inefficiency of German production relative to the Japanese can readily be seen in the fact that despite a 74 percent increase in production between 1983 and 1990, rates of labor productivity (value-added per employee) in the German industry were well below those in the Japanese industry, which grew at an even more spectacular rate (see Tables 8.1 and 8.2). Labor productivity in the German industry, moreover, did not keep pace with increases in output over the period, while in Japan they did. The gravity of this trend appears, however, only when German performance in international markets in the 1990s is taken into account. The incursion of Japanese and American producers into markets the Germans once dominated is indicated by the movement of world production and trade figures in the 1990s (see Tables 8.3 and 8.4). Since 1990, both Japanese and German

8. Daimler's reaction to this news is discussed in Morgan, Cooke, and Price 1992, 13f.

TABLE 8.1. Performance and Costs of German Machine Tool Enterprises

Indicator *	Unit	1980	1985	1989	% Share of Sales	
					1980	1989
Sales	Mill.DM	118	134	183	100.0	100.0
Material Consumption	Mill.DM	59	73	102	50.0	55.9
Value-added	Mill.DM	59	61	81	50.0	44.1
Out of which:						
Depreciation	Mill.DM	4	4	7	3.1	3.7
Staff Expenditure	Mill.DM	48	53	67	40.8	36.7
Other Costs	Mill.DM	3	3	4	2.8	2.5
Total Employees		1081	971	1053		
Data per employee:						
Sales	Thou.DM	109	138	174		
Staff expenditure	Thou.DM	45	55	64		
Value-added	Thou.DM	55	63	77		

* Average values for firms with more than 500 employees. In 1990, these producers represented 19.7 percent of all firms in the industry. 63.3 percent of all employment, a significant proportion of production and the bulk of exports in the industry.

Source: IFO Institut, Statistisches Bundesamt; table adapted from Engelman et al. 1994, 37.

production levels have fallen relative to the United States, Italy, and China, but the German descent has been much more precipitous than the Japanese. More ominous for the Germans, between 1992 and 1993, Germany's total share of world machine tool exports declined by 17 percent, while the

TABLE 8.2. Performance and Costs of Japanese Machine Tool Enterprises†

Indicator *	Unit	1980	1985	1989	% Share of Sales	
					1980	1989
Sales	Mill.DM	298	458	514	100.0	100.0
Material Consumption	Mill.DM	186	285	323	62.4	62.7
Value-added	Mill.DM	112	173	192	37.6	37.3
Out of which:						
Depreciation	Mill.DM	7	13	16	2.3	3.2
Staff Expenditure	Mill.DM	45	69	77	15.2	15.0
Other Costs	Mill.DM	23	38	34	7.7	6.5
Employees	Number	945	1171	1152		
Data per employee:						
Sales	Thou.DM	315.4	390.7	446.6		
Staff expenditure	Thou.DM	48.0	59.0	67.0		
Value-added	Thou.DM	118.6	147.3	166.4		

† Converted using 1989 exchange rate.

* Average values for firms with more than 500 employees.

Source: IFO Institut, Japan Development Bank, Ministry of International Trade and Industry (MITI); table adapted from Engelman et al. 1994, 37.

TABLE 8.3. World Shares of Machine Tool Production, 1990–1993 (%)

Country	1990	1991	1992	1993
Japan	23.3	32.9	25.1	25.3
Germany	18.9	25.0	22.7	18.2
USA	6.7	9.3	9.2	11.6
Italy	8.5	9.8	8.8	8.4
China			5.0	6.2
Switzerland	6.8	5.7	4.9	4.8
Taiwan		2.7	2.8	3.8
UK	3.7	3.6	3.0	3.4
South Korea		2.1	1.8	2.2
France		2.9	2.9	2.2
Others		6.0	13.8	13.9

Source: Cooke 1994, 8.

TABLE 8.4. Export Share of World Machine Tools, 1992–1993 (%)

Country	1992	1993
Japan	21.0	26.5
Germany	27.8	22.9
Italy	8.1	9.6
Switzerland	8.6	8.2
USA	5.9	7.0
Taiwan	3.8	4.7
UK	3.5	3.4
France	3.1	2.1
Belgium		2.1
Others	18.1	13.7

Source: Cooke 1994, 8.

Japanese share increased by 25 percent (despite nearly constant appreciation of the yen) and that of American industry increased by 20 percent. The attractiveness of German products in export markets is simply falling off. By 1994, Japanese producers of CNC (computer numerically controlled) lathes accounted for 25 percent of the *German* market for such machines (Cooke 1994).

INTERNAL REORGANIZATION: THE END OF GERMAN-STYLE DECENTRALIZED CRAFT MANUFACTURING?

The decisive difference between the systems of production increasingly being deployed by successful producers throughout Japan, the United

States, and elsewhere and the system of production practiced by large and small producers within the industrial district of Baden-Württemberg is the greater openness and flexibility of the production practices in the former systems. This is extremely paradoxical because it was thought during the 1980s that, in addition to the capacity to utilize specialized subcontractors, the flexibility of small and medium-sized German firms (and even some large-volume producers in the region such as Robert Bosch) rested on the tremendous resourcefulness and autonomy of broadly skilled workers in production and the close, cooperative relations between those skilled shop-floor workers and higher levels of management within the firm. The “lean” or “open” or “simple” forms of flexible organization diffusing in Japan, the United States, and elsewhere, however, rely on far greater worker autonomy and cross-functional and cross-departmental cooperation within the firm than is currently possible within the traditional internal organization of German craft producers (Herrigel and Sabel 1994; Naschold 1994; Kern and Sabel 1993; Rommel et al. 1995).

The sticking points within German firms are roles, jurisdictions, and hierarchies that date back to an earlier period of recomposition in the industrial system. In my book *Industrial Constructions* (Herrigel 1996, chaps. 2 and 5). I show that through the construction and elaboration of an industrial structure of coordinated specialization in the first part of this century, small and medium-sized specialist producers in Germany imposed a degree of stability on themselves that allowed them to rationalize the organization of work within their factories. Homologous processes of rationalization also occurred within large firms at that time (Herrigel 1996, chaps. 3 and 6).⁹ Out of this rationalization process emerged two clusters of roles and institutions that have become so pervasive in the organization of German industrial order that they are taken for granted as quasi-natural features of the organization of industrial work: (1) broadly defined yet distinct skill divisions within the production process, and (2) functional divisions within German managerial hierarchies. These institutionalized features of German industrial life played a very significant role in the post-World War II success of German producers, but they now constitute, at least in their current form, obstacles to effective adjustment to the challenge of alternative forms of flexibility.

9. It is perhaps obvious, but I think nonetheless important to remind the reader that rationalization should not be understood as the implementation of mass-production techniques. Rather, rationalization involves the clarification and definition of procedures, norms, and roles in any kind of production process. Werner Abelshauser makes the point that most of the rationalization in the interwar period occurred in batch-production processes and involved the optimization of the deployment of skilled labor. See Abelshauser 1994, 2.

The Creation of Specific Skills

The first outcome of the early-twentieth-century rationalization process was a system of specific and circumscribed skill categories in production, each with internal hierarchies based on experience and expertise that were supported by an infrastructure of vocational education. Prior to that first great period of rationalization at the beginning of the twentieth century, the internal structure of most small and medium-sized producers and many large-scale craft producers as well, was very open. Skilled workers were cut off, both socially and physically, from the old craft (*Handwerk*) system and deployed their abilities and developed their skills according to the needs of the firm and its customers. Since firms themselves tended to produce a wide variety of specialized products, skilled workers within the firms developed very general and broad skills. Just as in the old craft system, where artisans learned all the operations associated with the craft, the transplanted industrial craftsman learned as many operations as was necessary for the production of specialties associated with the enterprise that employed him (Adelmann 1979; Lee 1978).

During the period of rationalization, firms collectively limited themselves to the manufacture of a limited range of products in order to stabilize product market competition in a broad array of specialized manufacturing industries (Herrigel 1995, chap. 2). These reforms in the structure of product markets had significant consequences for the organization of production and labor markets within specialized producers. In particular, it made obsolete the very broad and general knowledge typical of nineteenth-century skilled craftsmen. Through a long and intense process of social and workplace struggle between management and labor, rationalization ultimately transformed the identity and the role of the skilled worker in specialist production. Skills were newly constituted as discrete and clearly bounded with focused hierarchies of learning that were accorded differentiated degrees of status in society and the workplace. Masters in factories, for example, went from being generalists in broad areas of craft production (such as machine making or ironworking) to specialists with particular, circumscribed areas of vocational expertise, such as lathe operation, tool making, or the repair of electrical circuitry. This process of rationalization was further refined in the early post-World War II decades when many industrial markets became more concentrated and product cycles changed more slowly. Relative stability encouraged the proliferation of specialized jurisdictions at the workplace (on these processes see Herrigel 1996, Seyfert 1920, Preller 1949, Freyberg 1989, and Kern and Schumann 1970).

Through this process, very specifically circumscribed skills and associated job ladders were gradually naturalized and integrated into the way that

people thought not only about industrial work and its organization but about virtue, honor, and status for industrial actors in German society.¹⁰ A skilled worker (*Facharbeiter*) demonstrated his or her integrity and acquired prestige through the perfection of his or her craft. Social standards for the evaluation of achievement existed because it was possible to distinguish one group of people's special skills and contributions to the production process from others, both on the shop floor and in the formal negotiations with employers. Moreover, job hierarchies within skill distinctions gave rise to social status distinctions both in the workplace and outside (Kern and Schumann 1970; Mooser 1984).

These relatively rigid role identities formed the basis for the emergence of the estate-like (what the Germans call a *ständische*) position of skilled industrial workers within Germany today. Skilled machinists, for example, are inculcated with a belief in the value of their own expertise for the firm and the significance of their skills for the prosperity of the German economy in the postwar period from the very beginning of their apprenticeships. Their identity as skilled workers provides them with a measure of dignity, and their capacity to exercise their skill and develop it contributes to their élan not only within the factory among their fellows but also in society at large as word and evidence of their expertise spreads throughout their communities. Skilled workers form the backbone of the strong German labor movement and dominate the institutions of workplace representation in German factories.

Finally, although the status of *Facharbeiter* groups skilled workers from all trades equally within the general space of social positions within German society, within each individual skill category there is a fairly rigid paternalistic hierarchy. Older master toolmakers, for example, direct less experienced ones and supervise the shopfloor training of apprentices. They organize the labor market and transfer by example and through instruction the values associated with their trade. Once the status of skilled worker has been achieved, moreover, hierarchy continues to structure the careers of the *Facharbeiter*, as those with greater dexterity or energy (or both) are allocated greater responsibility and given more challenging tasks (Weltz, Schmidt, and Sass 1974; Hildebrandt 1991).

This social world of skilled workers has been periodically modified over the course of the postwar period and quite significantly in the 1980s. In

10. For a theoretical description of this kind of deeply entrenched social understanding as an institution, see DiMaggio and Powell 1991, especially the introduction. Bourdieu (1977) refers to such deeply entrenched understandings of the world of practice as "doxa," while Schutz (1962) uses the term "cultural sedimentation" to describe social understandings and practices, such as those described here, which have become a kind of grammar for social behavior in a historically specific social formation.

order to facilitate workplace flexibility, the number of discrete skill designations has been decreased (Streeck 1987). Nevertheless, the underlying principle of specialized skill as a particular role with its attendant jurisdiction and inherent hierarchy continues to structure practice in German workplaces and the institutions that attend to them.

Functional Departments in Management

The second feature of the German manufacturing system that emerged out of the first great period of rationalization in the early twentieth century was the division of management into formal departments specialized by function: purchasing, marketing, development, finance, and production. These departments, which exist in all but the very smallest of enterprises, are typically staffed by a mixture of managers who have been recruited from the shop floor and those with more academic training. They too have particular conceptions of the role their particular department plays in the success of the company and career and status hierarchies based on and cultivated by performance and experience within the milieu of the department itself (Chandler 1990; Hartmann 1959). Initially, such divisions within firms had relatively modest consequences for the degree of bureaucratization within functional departments. But as firms grew larger, particularly with the diffusion of mass production during the Second World War and in the 1950s, bureaucratic hierarchies made up of tiers of specialized managerial positions within each of these functional departments grew very large and the ranks of middle management swelled tremendously (Thannheiser 1975; Pross and Boetticher 1971; Guillen 1994).

If not quite an estate like their blue-collar counterparts, management in Germany has, nevertheless, a very robust sense of its own position in society and of the kinds of achievements, credentials, and social entitlements that should be associated with its role in the economy. Unlike their American counterparts who, with the typical MBA, receive very broad and largely nontechnical business educations, most German managers are technically trained, either as engineers or as *Betriebswirten*, the latter being the far more specialized and technical German variant of the American business degree (Locke 1989 and 1984; Lawrence 1980). Once employed, German managers are typically both mentored and inculcated by their superiors with the traditions and nuances of life in the department and the firm. Technical expertise and seniority are the prerequisites for promotion and for the acquisition of social status.

During much of the postwar period, the German manager was unique for the degree of familiarity he or she showed with the production process and the technical characteristics of the products his or her firm produced. Indeed, the confluence of technical expertise and status in the career path of

managers appears to have had the interesting result of facilitating vertical communication within German firms without jeopardizing the hierarchy of distinctions. Many outside observers have noted the ability of German managers to communicate and cooperate with production workers and their representatives, while no one confuses even the lowest levels of management with industrial workers. Such communication allowed for considerable flexibility in production, because production management and labor were able to quickly reach agreement about problems and work together to adapt standard procedures to particular market needs.

Paradoxically, the same factors allowing for vertical communication within firms worked against effective horizontal or cross-functional communication and cooperation. Technical expertise was always specific, and then it was made even more specific as one gained experience in the firm. For example, mechanical engineers learned about the manufacture of a particular area of machine-tool making; accountants, the ins and outs of financial and tax regulations for the particular sector and size of firm that employed them. The process of gaining expertise and status turned managerial heads away from one another and focused them on the functional world in which expertise could be gained and careers made. All of this, naturally, contributed to the maintenance of hierarchy within firms as a whole because the only ones able to coordinate the operations of the various functional departments were those at the very top of the firm (Pross and Boetticher 1971; Lawrence 1980).

For all the success these two "doxic" features (Bourdieu 1977) of specific skill jurisdictions and functional divisions within management have enjoyed over the course of the twentieth century, these clusters of roles and institutions within the German industrial system are proving to be a liability under the current conditions of extremely short product cycles and rapid technological change (Herrigel 1996; Kern and Sabel 1993; Schumann et al. 1994, 643–64; Naschold 1994). The vulnerabilities of the system become clearest in the case of the introduction of new products. Each time a new product or a new technology is introduced—as opposed to an old one that is modified for a particular customer—the roles that each skill category and management function will play in the production and development of the new product must be bargained out. Each currently existing cluster of expertise and institutional power wants to participate; each has its own ideas and solutions; each defends its turf against encroachments from the others; each takes for granted the legitimacy of its claim on a place in the new arrangement within the firm. Electrical masters and technicians, for example, will fight with mechanical ones both on the shop floor and in the design studios over different kinds of technical or manufacturing solutions to problems that have direct consequences on the amount and character of work

that each will be able to do and on the contribution each will be able to make to the value of the product.

If the new product involves the increasing interpenetration of formerly distinct areas of technology and expertise—such as microelectronics and mechanical engineering—it will take some time to iron out all of the potential areas of conflict. If the market is stable, it might be possible, even preferable, to wait until these conflicts have been resolved before deciding on the final design of the new product. But, as has been the case in the 1990s, if the market is turbulent and unstable and the lifespan of the current technology is clearly going to be limited, firms are forced to bring their products to the market while these internal conflicts are still being worked out. More often than not, impatient, nervous senior managers pressed for time but no less ignorant of the technology or the market than the contending specialists, are forced to broker compromises between the players in a way that allows the solutions of each—to the extent that they are not contradictory—to be built into the product, simply to get the new product to market before the next wave of even newer products and technologies (Schlichter 1994). It should not be surprising that the products of such compromises will appear inelegant, overpriced, and “over-engineered”—they are.

DEALING WITH SELF-BLOCKAGE: SUCCESSES AND FAILURES

In German factories today the need to introduce new products more and more quickly has eroded the boundaries between traditional skill and management divisions and given rise to jurisdictional disputes that are driving up costs and driving down quality. Such jurisdictional conflicts do not exist in the alternative flexible systems that the Germans are competing against because these systems have fewer fixed jurisdictions and occupational identities in the first place. By combining development and production (simultaneous engineering) and utilizing modular sourcing and U-shaped, team-managed production lines, many Japanese and American competitors are bringing out new products relatively rapidly and cheaply that are elegantly designed, of high quality, and attentive to customer needs.

This is extremely difficult to do in the German system as it is constituted today in Baden-Württemberg. To implement more boundary-blending forms of cooperation (both vertical and horizontal) in development and production, the system of discrete skill jurisdictions, career hierarchies, and functional pillarization within firms must be deconstructed and recomposed in a more flexible way. Given the centrality of skill and technical expertise within the social organization of small, medium-sized, and large producers in Germany, however, this has not been proving easy to do.

Firms throughout the manufacturing economy have recognized the need to change, especially since the onset of crisis in the early 1990s and the emergence of the remarkable gaps between German levels of productivity and those of competitors.¹¹ Yet few producers, large or small, have been able to overcome the opposition of entrenched groupings of skilled workers who when threatened with the loss of status through incorporation into teams that deny the boundaries of former jurisdictional specializations or independent departments, have resisted the redefinition and dilution of their functional areas of power. It is difficult, after all, to tell workers and managers who with considerable legitimacy understand themselves as having contributed significantly to the traditional success of high-quality manufacturing in Germany that their roles have become obstacles to adjustment.

In many cases such conflicts have given rise to furtively self-undermining efforts of adjustment in formerly successful specialized German firms. The two examples of self-blockage to be discussed here were drawn from a pool of firms examined during a research sojourn in Baden-Württemberg in the summer of 1994.¹² Both cases show a dynamic of resistance to change on the part of entrenched jurisdictional interests, yet in one it is labor that is the primary sticking point, while in the other it is management.

These two examples of self-blockage will then be followed by two cases in which the resistance of entrenched interests has apparently been overcome. These cases make the important point that the absolute decline of German industrial competitiveness in the current environment is not inevitable, but that successful adjustment can be achieved if labor and management find a way to reconceptualize the fundamental features of social identity and industrial governance that have heretofore been considered central to German competitiveness.

TWO CASES OF SELF-BLOCKAGE

The first example of self-blockage is that of an electric turbine works in southwest Germany belonging to a large European electromechanical

11. Naschold (1994, 16) claims that despite the skepticism that emerged around the debate about lean production in Germany there is a consensus within the current discussion of work reorganization on the need for a fundamental reorientation. In particular, most people agree on the need for zero-defect manufacturing, customer-oriented process chains, decentralized responsibility in production, new constitution of the relationship between conception and execution within the firm, and the institution of processes of continuous improvement in production.

12. These cases were selected from over thirty interviews with German manufacturers, trade unionists, government officials, and association bureaucrats conducted in Baden-Württemberg in June and July of 1994 by the author and Charles F. Sabel of Columbia University Law School.

multinational (interview, June 1994—name of firm withheld by request). The globally active parent concern has systematically attempted to implement many of the characteristics of the alternative form of open flexible system mentioned above. It has cultivated the development of a new kind of management career in which individual managers move cross-functionally throughout the organization, accumulating knowledge of the company, its products, its suppliers, and its customers. Promotion within the parent firm is increasingly becoming contingent on having successfully participated in cooperative product development teams made up of members of different departments as well as key suppliers. To encourage this, the parent company has introduced what it calls a Customer Focus Program (CFP) throughout its subsidiaries. This CFP brings managers together across subsidiaries as well as across functional departments on a regular basis to foster dialogue on how to improve company products and develop new technologies. This is not simply a discussion group, however. Because it reconstitutes itself regularly, the CFP also acts as a kind of monitoring forum for projects and subsidiaries throughout the organization. In many subsidiaries, this collaborative, team- and product-oriented organizational practice has been taken right down to the shop floor in the form of group work and product-oriented, low-inventory production.

Not so in the turbine works under discussion. Hierarchy flattening has occurred within the departmental structures above the shop floor, where a number of CFP groups exist. But the production process itself remains dominated by the old workshop system of skill distinctions and hierarchies. The plants in southwest Germany continued to be organized around specialized machine and/or part production. Typically, any given work station operates with an inventory of up to five days. Operators working on particular machines dedicated to the production of a specific range of parts had little idea where their work object fit into the larger product the plant was constructing—one machinist had no idea where the parts he was making were going to go next in the line of production. Masters and foremen set up machines.

Why has this system of skill jurisdictions continued to exist beneath an increasingly open, flexible, management structure? In part the answer stems from the strategy that the local firm pursued after the former parent company of the German turbine works merged with another European electro-mechanical producer in the late 1980s. Prior to the merger, the German plant was capable of making complete electrical turbine generators. After the merger the plant was broken up and parts of the production process were shifted to facilities in other locations. The southwest German plant was specialized on large-part production. Thousands of layoffs resulted from these changes in the location of production. Perhaps understandably,

given the massive job losses, the works council and trade unions have been reluctant to engage in additional restructuring within the production lines that remain for fear of additional layoffs. The local labor representation was persuaded that additional losses would redound to its disadvantage and therefore defended the traditional job structure. Labor representatives resist the new structures, in other words, because they believe they must defend the traditional roles and status of the workers they represent if they are to retain their own power and position within the firm and their institutional position in the labor market. But management, which is committed to the larger European parent company, but not to the southwest German location, is becoming increasingly frustrated and is currently considering relocating.

The second case of self-blockage is a medium-sized machine tool company in southern Württemberg. Here, an important obstacle to the adoption of the new system has been management, not labor (interview, June 1994—name withheld by request). This machine tool company manufactures large-scale stamping machines for the automobile industry. The company has made tremendous strides toward completely revamping its production process through the introduction of integrated product islands and group work. The traditional workshop system has been modified so that machines are now grouped around the production of particular groups of products rather than around parts for all products. All set-up, production-planning, and delivery-scheduling tasks, formerly carried out by the masters and foremen of the individual machine shops, or by a level of middle management located directly above the floor of the plant, have been integrated into the new product islands. Members of product-development teams, moreover, now continually move between activity in the production teams and the relocated engineering rooms on the shop floor. Technicians, programmers, engineers, and skilled machine operators now work side by side in close cooperation and to some extent interchangeably within the teams. Groups within the islands have begun electing their own representatives to facilitate the coordination of their own internal duties as well as to maintain contact with the operations of the other groups and other product islands.

There are two factors within the firm, however, which significantly disturb the operation of these islands and constrain their ability to produce significant gains in efficiency and cost reduction. First, the changes in production have only been introduced in the areas of direct mechanical production—areas of work preparation, such as tool making and materials purchasing, have neither been organized into teams nor adapted to the needs of teams. As a result, teams have only limited control over their overhead costs. Since the idea of the introduction of teams is to devolve responsibility for holding down costs to the teams themselves, lack of con-

trol over overheads engenders frustration on the shop floor—and skepticism regarding the effectiveness of the new system. Changing this arrangement, however, involves attacking the privileges of some of the most highly skilled workers in the plant (toolmakers) and the prerogative of purchasing managers—something the management of the firm, at least until now, has been unwilling to do.

Second, changes in production have not been accompanied by corresponding efforts to deconstruct the hierarchical relations between top management departments and the newly emergent product-team structure. Management has retained the right to veto group decisions that it believes will not result in the cost savings it desires. It has also retained control over the budgets of the product islands: company management, not the teams, make investment decisions and ultimately evaluate the performance of the teams. A speaker for one of the product islands as well as the head of all manufacturing at the firm claimed that this limitation on local autonomy and the continued existence of hierarchy threatened to undermine the effectiveness of the product islands and teams. When members of the group believe that their success or failure is the direct result of their collective efforts, all have an incentive to make continuous improvements. Without local autonomy, however, such incentives do not exist, and the commitment of team members to the success of the team is undermined.

Both examples show that a partial movement away from the old principles of specific skill jurisdictions and functional departments diminishes the credibility of the new organizational principles in the eyes of the participants. Making a full commitment, however, means taking privilege and authority away from those with little desire to give them up. Clearly there is no equilibrium with the current arrangement. Doing nothing leads to the gradual erosion of morale and enthusiasm within the new product islands; returning to the old system of specific skill jurisdictions and functional divisions within management prices the firm out of the market; moving forward requires the spilling of blood. Someone is going to lose this battle, and the stakes in the world market at the moment are such that it may be the firm itself. Given that conflicts of this kind are legion at present throughout Baden-Württemberg and the German industrial economy generally, it is easy to see that the current situation is a grave one for German industry.

SELF-BLOCKAGE TRANSCENDED: GERMANY REINVENTED?

There is a ray of hope in the gloomy picture the preceding examples have painted. In two other cases, producers have been able to overcome entrenched interests and transform the entire organization and structure of how they produce industrial goods. Both cases also demonstrate, however,

that successful adjustment poses very profound questions about identity, authority, and institutional design in labor and product markets narrowly and in German society more broadly. Indeed, moving from these isolated cases of success to a general process of successful adjustment ultimately will have to involve a collective process of self-reinvention on the order of the kind of transformative social discussion that took place during the first great period of rationalization at the beginning of the twentieth century.

The first example of a producer that has apparently been able to successfully break from the old system of skill jurisdictions and functional departments and adopt a more open and flexible alternative is the medium-sized family firm, Getrag, located in northern Württemberg. The firm is a manufacturer of high-performance gear units for standard-shift automobiles. Getrag began to initiate major changes in its organization in 1987 in order to meet stringent cost and quality terms being demanded in a new contract with BMW (itself a company that has made great strides toward the adoption of the alternative system, see Sabel, Kern, and Herrigel 1991, and Herrigel 1996, chap. 6). According to a spokesman for Getrag, the reorganization was to be guided by the idea that the new organization would be defined more by a process of change than by a specific organizational structure. The company literally and somewhat naively set out to constitute “trusting” relations among all actors within the firm, regardless of role or position, based on mutual respect. It discouraged thinking in terms of hierarchy and status and made all information about the company (its finances, its products, its suppliers, its customers) available to everyone within it.

To realize this, product teams were created that combined the previously separate departments of development, planning, purchasing, and production. The many levels of management hierarchy in the old system between top management and shop floor were reduced to three. Relations with Getrag suppliers were also reformed so that their parts and materials would be delivered according to the stringent cost and quality standards of the *Kanban* system.

It is at the level of the production process, however, in which the departure from the old system can be seen most clearly. In the restructuring, the production process was broken down and completely reorganized. All line and workshop organization was eliminated, and production and assembly islands, governed by autonomous work teams, were introduced. Members of the teams allocate work among themselves and take responsibility for most aspects of their quality control and maintenance. Island teams possess a small budget to help them perform these tasks. Teams also have the option of turning to different suppliers—inevitably also outsiders—to ensure that their quality responsibilities are met. Workers in the teams are not constrained by old skill categories: their responsibility is to keep the island

performing at exacting cost and quality standards in the best way that they can.

One of the ways they do this is to interact with the other work teams and with suppliers in order to continually optimize and improve the entire production flow. In an effort to encourage this kind of cross-boundary communication, even the old apprenticeship system is being broken down. Rather than train workers in specific trades away from the production process under the stewardship of masters, the firm attempts to integrate the apprentices into the teams from the start. Rather than learn a specific craft skill, newer apprentices are trained in the much more demanding trade of general problem solving and cooperation.

The new system, which the firm has been introducing piecemeal over the last seven years, has been tremendously successful. The firm has rates of machine utilization above 80 percent in the teams, while serviceability rates on the same production machinery (time not spent in repair) are over 90 percent. Moreover, over the course of the last seven years, the firm has introduced three new generations of its product.

A second example of successful adjustment is the small machinery firm Mettler Toledo, a maker of electronic scales and weighing devices in the Schwäbische Alb in southern Württemberg. Reorganization at Mettler Toledo was brought on by a financial crisis associated with an unsuccessful shift to new microelectronic variants of their product during the mid-1980s. New management was brought in with a mandate to restructure the company radically. Management made two major moves. First, all production was shifted onto area suppliers so that the company could focus its energies fully on product development, product assembly, and sales. Relations with suppliers, which were already very close and cooperative before the reorganization, were intensified; important providers were drawn directly into the development process.

Second, all remaining activities within the firm were reorganized into teams. No functional divisions or departments survived the reorganization, and all levels of formal middle management associated with those areas were dissolved. The company was reorganized around products and process. Teams organized by themselves the development and production of new products and dealt with the continuing needs of existing customers. The emphasis was on total process optimization and improvement. Teams maintained intimate and open contact with the assembly workers about individual orders. Assemblers worked as individuals and had responsibility for the complete assembly of a product. They could call on team members for advice and service at any time. As at Getrag, this reorganization at Mettler Toledo led the firm to attempt to get away from the old specific

skill jurisdiction-based system of apprenticeship and to integrate apprentices right from the beginning into production and team work.

Neither of these successes were painless. Both were initiated in periods of financial and market crisis for the firms. The elimination of hierarchy involved the dislocation of many unnecessary jobs in middle management. The introduction of teams made it possible for fewer workers to perform more operations—which made many other workers redundant. Hundreds of workers and managers lost their jobs at Getrag and Mettler Toledo over the course of the long transition to the new system. Moreover, the cases are fairly isolated within the landscape of German industrial producers, and their situation is unique because of the early onset of crisis. Nevertheless, they are important to note because they make it difficult to claim that the Germans cannot change and that they must live or die by the old system of specific skill jurisdictions and functional departments.

Movement beyond these isolated cases, however, will require that all actors in the German industrial system reevaluate their own roles and their relations to one another. The effect of team work on how firms view vocational training is one example of how processes of reform within firms also involve institutional systems that go well beyond the firm's boundaries. At both Getrag and Mettler Toledo, teams are flirting with illegality by integrating apprentices into actual team work—there has been a long taboo against using apprentices for productive labor. It is by no means clear that the vocational system will be reformed to accommodate this kind of behavior. Reform would make it easier for other producers to do the same, as well as remove an institutional support for the old system of jurisdictions. There is likely to be opposition to this not only among skilled workers and their representatives but from instructors in *Berufsschulen* and *Fachhochschulen* as well, who themselves possess identities and roles in the educational system that correspond to the old system of skill jurisdictions (as well as to old distinctions between management and labor in production). Accommodation at a general institutional level in a way that would allow experiments to become generalized would invariably call these secondary identities, roles, and relations within the supporting infrastructure of institutions surrounding the industrial economy into question.

Will the creation of new kinds of workers and new institutional arrangements within firms result in the creation of new kinds of educators and a new system of disciplines in the academy capable of serving the industrial economy? It is not possible to answer this question now, but it is easy to see in this case how debate and experimentation about the reform of roles and positions within firms must lead to reevaluation and debate about the relationship between the firm and the identities, roles, and structures of

supporting institutions in society. Failure to engage in this process of collective self-redefinition could ultimately be devastating for German international competitiveness; doing so will involve a massive reconceptualization of the German industrial order.

This example of the relationship between internal reform of production and the reform of vocational training is only one among a myriad of interconnected changes currently taking place in Germany. With more space, it would be possible to show how teams are creating a system of workplace representation that could potentially rival, if not supplant, the one that currently exists in German workplaces. How will trade unions deal with self-governing work teams in which the old distinction between management and labor no longer applies? What will happen to traditional conceptions of the firm and private property if existing firms recompose themselves into self-governing production teams with their own budgets? None of the old actors in the German industrial system are unaffected by the current changes, and all will be participating in the public dialogue that will invariably accompany it. It seems fairly clear that whatever happens, the roles and identities of actors and the institutional structures that help to support and govern them will be (re)constituted simultaneously in and through the process of dialogue itself.

TOWARD A NEW SYSTEM OF FLEXIBLE PRODUCTION?

This is a crucial period for German manufacturing. If firms, large and small, succeed in adopting and adapting within themselves the same kind of low-inventory, low-cost, high-quality manufacturing of their most sophisticated competitors, it could very well result in the complete transformation in the kind of decentralized industrial production that has existed in regions like the southwest of Germany for much of the twentieth century. Already extensive external decentralization (the existence of collaborative ties beyond the boundaries of the firm) will be matched by the dissolution of the internal architecture of the firm in a way that integrates development and purchasing with the shop floor in the form of self-recombinatory teams.

If, on the other hand, the entrenched interests in the old departments of management and among the various skilled groupings on the shop floor succeed in blocking movements in this direction, it is difficult to imagine, given the dramatic productivity and cost differentials currently separating German producers from their major competitors, how the decentralized industrial order can continue to reproduce itself in the form it adopted in the 1980s. German flexible manufacturing finds itself at a crossroads not unlike the situation it faced at the beginning of the twentieth century during the great period of rationalization and the subsequent diffusion of mass

production. An unprecedented and extremely strong challenge from abroad is creating the conditions as well as the incentives for producers to break out of and recompose existing arrangements. Time will tell how plastic the current system actually is and how much of it, if any at all, will survive.

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