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978-0-521-12504-8 - Technical Workers in an Advanced Society: The Work, Careers and Politics of French Engineers

Stephen Crawford

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Technical workers in the advanced societies

The decline of the “smokestack” industries and the growing importance of such “science-based” industries as electronics and aeronautics have stimulated much theorizing by sociologists about the consequences for the social structure and stability of advanced societies. Much of the literature has focused on the implications for the social values and collective action of a middle-class occupational group that has expanded rapidly with the rise of the science sector: industrial engineers and technicians. Most of the authors of this literature anticipate a growing resistance by technical workers to their traditional role in industry; some foresee new challenges to the very legitimacy of bureaucratic authority or capitalist society.

Despite such theorizing, only two empirical studies compare the position and values of technical workers in “old” and “new” industry: Zussman’s (1985) book on American engineers and Whalley’s (1986) volume on British engineers. This study of French technical workers both complements and builds on their important work. It reports on the findings of an investigation into the work, careers, and ideologies of French engineers and managers employed in two industrial settings, a traditional metal-working firm and an advanced telecommunications firm. In the process of assessing and criticizing existing theories, the book also advances its own argument. It shows the significance of a factor largely neglected by all the theories of post-industrial employment, the structuring of careers. It goes on to argue that career structures reflect national institutions as much as any imperatives of industrialism or capitalism, but that such institutions are often peculiar to specific sectors and strata.

This study focuses on France for four reasons. First, recent cross-national investigations of industrial workers (Cole, 1979; Gallie, 1978) and companies (Maurice et al., 1977, 1986) in industrially matched settings reveal large national variations in the organization and experience of work.

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Second, the recent books by Whalley and Zussman on British and American engineers provide an opportunity for a study of a third advanced society to identify the distinctively national aspects of the social position of engineers. Third, even a brief examination of engineering in several advanced societies reveals that while French engineers do much the same work as their counterparts elsewhere, the organization of their careers is distinctively French. Only in France are engineering schools part of the elite half of a bifurcated higher education system, and only in France are practicing engineers divided into three fundamentally different categories. Finally, it is in France that some of the most controversial ideas about technical workers in advanced industry have emerged. It is reasonable to suspect that these ideas reflect real developments in France, even if the explanations are wrong or too readily generalized to all advanced or capitalist societies.

Whatever the political significance, it is clear that the technical occupations have grown enormously in recent decades. The United States census of 1980 reports an American population of 1,537,000 engineers. This figure represents an increase of 183 percent since 1950, a much greater increase than the 73 percent for the employed population in general, although slightly less than the 207 percent for that most rapidly growing of the broad occupational groups, "professional, technical, and kindred workers." Within the latter category, engineering is the second largest "occupation" (after public school teaching) and the largest one for males and in industry.

In France, the growth figures are comparable. The French census of 1954 reveals a total of 75,808 *ingénieurs*.¹ The figures for 1975 and 1982 are 256,290 and 299,000 respectively, about half of which are *ingénieurs diplômés*, i.e. graduates of engineering colleges. The 1975 figure represents a growth of 238 percent, compared to a growth of 136 percent for non-technical managers (*cadres administratifs supérieurs*), 82 percent for lower level administrative personnel (*cadres administratifs moyens*), 91 percent for office workers, and 14 percent for the labor force in general. The only major occupational category in the French classification that grew more rapidly than engineers, was that of *techniciens*, up from 193,206 in 1954 to 758,690 in 1975, or 293 percent. Together, *ingénieurs* and *techniciens* had gone from representing less than 1.5 percent of the French labor force in 1954, to almost 5 percent (.0466) in 1975. Five percent of the total work force means a considerably higher percentage of the industrial work force. Not surprisingly, the high technology industries have much higher concentrations of technical workers. For example, in 1976 *ingénieurs* accounted for only 1.4 percent of all steel industry employees but 9.2 percent of all employees in the aeronautical industry (UIMM, 1977: 76, 77, 93, 94).

The second part of this chapter introduces the theoretical debates and empirical issues that inform this study. Chapter 2 describes the research strategy, sites, and samples. Chapter 3 presents the full text of an interview

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with one telecommunications engineer. Chapter 4 focuses on the knowledge that French engineers use, addressing in particular Daniel Bell's argument about the growing importance of theoretical knowledge. Chapter 5 examines the position of French engineers in the division of labor, giving special attention to theories of deskilling. Chapter 6 looks at the location and attitudes of French engineers with respect to the division of authority, and analyzes the evidence for any decline in the legitimacy of bureaucratic authority. Chapter 7 considers the career structure of French engineering and the attitudes of engineers toward their careers. Chapter 8 examines the collective organization of French engineers, addressing in particular Freidson's theory of professionalization and Mallet's vision of a "new working class." Chapter 9 analyzes the politics and class position of these engineers. A concluding chapter summarizes the findings, and offers an approach to interpreting them that departs in critical ways from both the Durkheimian and Marxist traditions of occupational and class analysis.

Theories

Claims about the emerging dilemmas and reactions of engineers can be conveniently divided into those that emphasize occupation and those that emphasize class. Both approaches view position in the division of labor as the major source of a person's ideology and social participation, but where occupational analysis focuses on the particular tasks people do and the skills involved, class analysis stresses broader categories of authority over property and people. A major issue in the occupational analysis of salaried experts is whether or not they are undergoing "professionalization," that process by which certain occupations become respected and powerful enough to assure their practitioners autonomy in work as well as high salaries and prestige. Class analysis raises several issues, for there are not only Marxist and non-Marxist versions of it, but different variants of each. Most prominent among the Marxist approaches are theories of "proletarianization" and a "new working class." Much less Marxist in its current form is the theory of an emerging "service class" of responsible experts and managers. Finally, there is an important version of class analysis that shares much in common with professionalization theory in its prediction of the rise of a new "professional class" based on knowledge rather than property. This section reviews the key arguments made by the major contributors to this theoretical debate about the place of technical workers in advanced societies.

Professionalization

One reason that American sociologists have long emphasized occupational categories over those of class, is that certain occupations – especially law and

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medicine – have achieved enormous power and prestige within American society.² A recurring claim in the literature on these “professions” is that professional values and norms differ significantly from those of business enterprises and bureaucratic organizations.³ Professionals are distinguished not simply by the complex and codified character of their knowledge, but also by their exceptional autonomy and authority in the use of that knowledge. Such autonomy and authority stem in part from the public’s *trust* in professional claims of commitment to client and public welfare and from the public’s confidence in occupational self-regulation.

These alleged differences in professional values and norms are said to generate “value conflict” and “role strain” for professionals who work in bureaucratic settings. Kornhauser (1965), identifies several such conflicts among scientists in industry, the problem being that industrial research is shaped and scheduled by company executives who are not scientists and whose goals are profit, not the expansion of human knowledge. The normal reward for faithfully serving the bureaucracy is vertical mobility within the organization, but local mobility into management is of little interest to professionals, for whom success involves broader recognition within their occupation.

Kornhauser’s study, however, was limited to scientists and engineers working in research laboratories. The question is whether or not his model of conflict between professional and organizational values is applicable to the majority of industrial engineers. There is considerable evidence that it has not been in the past. On the basis of a large sample survey, Goldner and Ritti (1967: 491) report that “Engineers generally enter industry with non-professional goals . . . are oriented towards entrance into positions of power and participation in the organization rather than simply practicing their original specialties . . . and strongly identify with the organization and its goals.”

This is not surprising when one considers the long history of career mobility into management for American engineers. In his study of the career patterns of engineering graduates from 1884 to 1924, William Wichenden (Noble, 1979: 41) found that within fifteen years of graduating from college, about two-thirds of these engineers had become managers. More importantly, such mobility into management represented *professional* success in the eyes of engineers. Consequently, as David Noble (1979: 42) observes “the potential conflict between professional integrity and subordinate corporate employment did not arise simply because their unique notion of professionalism was one which neatly embraced corporate position as the mark of status within the profession.” On the basis of his study of engineers in several European countries, Torstendahl (1982: 262) similarly argues that the industrial engineers emerge as both “professional men” and “new

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bureaucrats,” and that professionalization and bureaucratization “did not in any obvious way prevent each other’s development.”⁴

Research on more contemporary engineers supports a view of them as predominantly “local” in orientation rather than “cosmopolitan.” Perucci and Gerstl (1969: 179) emphasize the lack of a professional community among engineers and the “relative absence of major conflict between organizational and professional norms concerning autonomy.” In short, by the early 1970s, sociologists (Carter, 1977; Ritti, 1968, 1971; Rothstein, 1969; Wilensky, 1964) were largely in agreement that analyzing engineers as professionals shed little light on their particular dilemmas and attitudes.

Recently, however, two influential theorists of post-industrial society have rekindled the role strain argument in the distinctive context of the expanding, science-based industries. Many of the writers about post-industrial society (Lane, 1966; Etzioni, 1968; Galbraith, 1968; Bennis and Slater, 1968; Touraine, 1971) point to the growing importance of “knowledge-based” work, but Daniel Bell (1972, 1973) and Eliot Freidson (1973a, 1973b) stand out for their emphasis upon the changing role and social significance of knowledge in production. For Freidson, moreover, this strain is rooted in the professionalization of knowledge-based workers.

Freidson observes that in the emerging post-industrial society, a growing proportion of production workers are “knowledge-based” workers whose increasingly abstract skills require long periods of formal training in specialized schools. He claims that “such higher vocational education does not merely insert knowledge into people’s heads, but also builds . . . occupational identities and commitments” (1973a: 52). The result is the development of “occupational solidarity,” among the workers practicing the same specialized skill. In Freidson’s words (1973a: 52):

Their skill is not merely abstractly there as a potential, but it is institutionalized as a stable discipline or occupation. Such trained workers do not constitute a class of labor which can be treated as mere hands, to perform whatever tasks management may invent for them and then train them for. Rather, they are a kind of labor with pre-existent skills for which management may have a need but which management must take more or less as given. Their tasks are institutionalized occupationally, and thus resist simplification, fragmentation, mechanization, or some other mode of managerial rationalization of labor.

The capacity to resist management pressure toward rationalization and integration is reinforced by whatever degree of monopolistic labor market control the occupation can gain through control over the recruitment, training, and licensing of its practitioners (Freidson, 1973b: 27). It is also reinforced by the fact that the new “knowledge-based work, the work of middle class experts, professionals and technicians, is by *its very nature* not

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amenable to the mechanization and rationalization which industrial production and commerce have undergone in the past century” (1973a: 55). For these various reasons, management is unable to fully control the labor process. Rather, knowledge-based workers and their occupational associations will increasingly define tasks, determine who is qualified to perform them, and control and evaluate performance. In view of the high concentrations of knowledge-based workers in the science-based industries, it follows that such challenges to bureaucratic authority will be most pronounced in the high technology sector. This study tests such expectations by comparing the occupational identification and the attitudes towards bureaucratic authority of French engineers in low and high technology settings.

Proletarianization

Classes group together persons engaged in a wide variety of occupations on the basis of shared location in the social hierarchy. In Marxist analysis, this hierarchy is a structure of economic power characterized by dominant and subordinate positions. Technically speaking, proletarianization refers to downward movement by an individual or group in this hierarchy of classes. Thus, the movement of peasants and self-employed artisans into jobs as employees of someone else constitutes proletarianization. However, most Marxists recognize that among dependent employees there are great variations in both market power and work autonomy, and that these in turn are linked to skill level. In this context, proletarianization has come to refer to declines in the skill and autonomy of work that result from management efforts to better control the labor process. It is this second meaning of deskilling that Marxists have in mind when they apply the term proletarianization to engineers.

The most influential recent statement of the proletarianization argument is Harry Braverman’s *Labor and Monopoly Capital*, published in 1974. Although Braverman’s book focuses on the historical deskilling of craft and clerical workers, its chapter on the current “middle layers of employment” includes a discussion of engineers and technicians. Braverman (1974: 243) argues that “having become a mass occupation engineering has begun to exhibit, even if faintly, some of the characteristics of other mass employments: rationalization and division of labor, simplification of duties, application of mechanization, a downward drift in relative pay, some unemployment, and some unionization.”

This is about all Braverman has to say about engineers, but several other sociologists have applied the deskilling thesis to professionals and managers. Of particular interest are recent articles by Derber (1982; 1983), Meiksins (1982), Larson (1980), and Bauer and Cohen (1980; 1982). Derber (1982: 8) claims that “like other workers,” professional employees “have become detail workers, unable to choose their own projects or tasks and forced to

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work at the rhythms and procedures institutionalized in the job descriptions and standard operating procedures of the organization.” Although not yet subjected to the intensive rationalization and control of “technical proletarianization,” they suffer from “ideological proletarianization.” Engineers, for example, “are deprived of their right to select and formulate their own research objectives,” and experience a “loss of control over the organizational uses and application of their technical investigations” (1983: 319, 321).⁵

Proletarianization theorists who make more straightforward claims about the fragmenting, deskilling and routinization of engineering work include Carchedi (1977) in England, and Bauer and Cohen (1980; 1982) in France. Groux (1985: 31) cites Bauer and Cohen in attributing recent patterns of *cadre* unionism to “an increasingly taylorian organization of intellectual labor, which implies a modification and fragmentation of the tasks of *encadrement*, a reduction in their contents, and a degradation of the conditions of work of *cadres*.” (The word *cadres* is best translated into English as managerial and professional employees.)⁶ Bauer and Cohen, however, also emphasize the organization’s appropriation of technical knowledge and the “crystallization” of such know-how in manuals of procedure. In their words, “it takes only a little experience inside large industrial firms to discover the multitude of bibles which specify very precisely, for all areas of work, exactly how to formulate and resolve” the problems met by engineers (1982: 459).

It is not only academic sociologists who make such proletarianization arguments. The French Communist Party (PCF) offers a very similar analysis of the fate of “middle strata” under “state monopoly capitalism” (Ross, 1978). But while the proletarianization theorists neither distinguish between low and high technology industries, nor claim that objective proletarianization is producing working-class politics, the PCF does both. According to it, deskilling and wage reductions don’t make professional employees members of the proletariat as long as they remain engaged in unproductive labor, but do make them more disposed towards alliances with the working class. Moreover, for certain white-collar workers, routinization of their work is associated with the emergence of the “collective laborer” in the technically advanced sectors, by virtue of which many engineers and technicians “become productive workers and hence bonafide members of the working class” (Ross, 1978: 168). In an effort to test these theories of proletarianization, the following chapters examine and interpret developments in the work, pay, unionization, and politics of French engineers.

New working class theory

The PCF analysis of the “middle strata” was roundly criticized by other French Marxists. Nicos Poulantzas (1978) argued that the PCF’s impatience

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to recruit electoral allies was blinding it to the inherently middle-class position of engineers and middle managers, and leading to social democratic compromises in the party's traditional revolutionary goals. More influential, however, was a group of critics that made almost the opposite argument. These "neo-Marxists" questioned both the progressiveness and revolutionary capacity of the modern proletariat, and the applicability of the proletarianization thesis to knowledge-based workers in advanced industries.⁷ Nevertheless they saw in these knowledge-based workers the vanguard of a radicalized "new working class."

France's post-war economic "miracle," including the surge in workers' real incomes and the rapid growth of non-manual occupations, generated serious doubts on the French left about the more orthodox Marxist theories of proletarianization and pauperization. Liberal sociology's notions of working-class "embourgeoisement" and middle-class professionalization offered unappealing alternatives, as did the "critical theorists'" discouraging view of technical workers as increasingly effective technocratic legitimators of the existing social system.⁸ In this economic and intellectual context, a handful of innovative French leftists – Mallet, Gorz, Touraine, etc. – developed in the 1960s a new analysis of the technical stratum, one dispensing with such shaky notions as proletarianization and "false consciousness," but giving a radical turn to liberal theories (Blauener, 1964) of worker integration in advanced industries.⁹

The boldest and most influential statement of "the new working class" thesis is the late Serge Mallet's book of that name (1975).¹⁰ Mallet thought that workers in the high technology sector are not only more skilled, secure, and highly paid than workers in traditional mass-production industries, but that they also enjoy greater autonomy and professional challenge in their work and more involvement in small work groups that cut across traditional hierarchical differences of rank. Yet, he did not believe that such "objective integration" leads to subjective integration in a capitalist firm. On the contrary, it accentuates the worker's experience of certain "contradictions" inherent in capitalism, especially in the case of technical workers.

The most important contradiction is that between the job and the organization. The job of a technician entails autonomy and involvement; it invites and rewards creative participation in production. The organization, on the other hand, is bureaucratic and hierarchical, and technicians are permitted little if any voice in its decision-making processes. Such powerlessness in a work situation that is otherwise involving rather than alienating creates an inconsistency that gives rise to greater frustration and militancy than found among traditional workers.

A second contradiction concerns the strategic position of technicians in science-based industries, and recalls Veblen's (1965: 69) analysis of engineers as the "indispensable General Staff of the industrial system." By

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virtue of its technical knowledge and central role in the production process, the technical staff understands the techniques of manufacturing well enough to manage without guidance from the official managers. And by virtue of its critical place in the actual operation of factories, the technical staff is in a strong position to challenge the status quo. Aware of these technical and political capabilities, the technical stratum thus experiences capitalist management as all the more gratuitous and intolerable.

Third, there is a value conflict here that calls into question the legitimacy of capitalist management. Again new working class theory resembles the much older analysis by Veblen, who saw the relationship between engineers and capitalist managers as inherently conflictual. Veblen (1965: 74) argued that sooner or later the engineers would revolt and take command, not only because they have the capability, but also because “by training, and perhaps also by native bent, the technologists find it easy and convincing to size up men and things in terms of tangible performance, without commercial afterthought,” and thus “are beginning to understand that commercial expediency has nothing better to contribute to the engineer’s work than so much lag, leak, and friction.” Similarly, new working class theorists (Gorz, 1967: 103–4) maintain that the subordination of research, development, and knowledge diffusion to the logic of capitalist profit-making violates the “higher rationality” and service orientation implicit in technical work and emphasized during education in the sciences. In short, by virtue of their culture of technical work, engineers are anti-capitalist.

Mallet, Touraine and Gorz mention other contradictions, and disagree about some of them. They agree, however, that the essential problem is organizational alienation rather than economic exploitation, and that as a result, the new working class is less concerned than the “old” about wages, but much more concerned about control. *Autogestion* – workers’ self-management – is the characteristic demand of the technical and skilled workers in the high technology sector. The interest in democratic control also manifests itself in new forms of anarcho-syndicalist and plant-specific unionism (*syndicalisme d’entreprise*). In Mallet’s and Gorz’s versions, the class character of this movement means challenges to capitalist rule in the political arena as well as in the workplace. *Autogestion* within the plant is but the first step in an unfolding social revolution, one that builds socialism from the grass roots up rather than through the seizure of state power.

New working class theory was widely discussed and debated in France during the 1960s and early 1970s, especially after the student riots and general strike of May–June, 1968. Gorz himself changed his view. In a passage that echoes C. Wright Mills’s pessimistic conclusions to *White Collar*, Gorz writes: “More often than not the rebellion of intellectual workers is profoundly ambiguous: they rebel not *as* proletarians but *against* being *treated* as proletarians.” Aimed at the “reinstatement of the privileges

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they once enjoyed as members of the professional ‘middle class,’” such struggles “are, in fact, anti-monopolist rather than anti-capitalist in character . . . and as likely to become fascist as reformist” (1976: 178–182).

Non-Marxists were equally skeptical. The British social theorist, Anthony Giddens (1973: 196), criticized some of the basic premises, especially the claim that the groups referred to in any way constituted an actual class. On the American side of the Atlantic, Daniel Bell (1973: 154) ridiculed new working class theory as “simply a radical conceit, and little more.”¹¹ Nevertheless, this theory remains influential and valuable, especially in France. Thus, the chapters on authority, unionization, and politics analyze this study’s evidence for and against it.

Professional class and service class

Like Freidson and others, Daniel Bell (1973: 20) sees “post-industrial society” as distinctively knowledge-based:

Industrial society is the coordination of machines and men for the production of goods. Post-industrial society is organized around knowledge, for the purpose of social control and directing of innovation and change; and this in turn gives rise to new social relationships and new structures which have to be managed politically.

What distinguishes Bell’s argument, however, is his (1973: 20) emphasis on the increasing significance of theoretical knowledge, “the primacy of theory over empiricism and the codification of knowledge into abstract systems of symbols.” Bell argues that the post-industrial industries of computers, electronics, optics, and polymers are “science-based” industries in a way that the steel, automobile, telegraph, and electricity industries are not. The latter “were developed largely by talented tinkerers who worked independently of the fundamental work in science” (1973: 116). By contrast, the science-based industries “are primarily dependent on theoretical work prior to production,” and thus represent a changed and newly intimate relationship between science and technology (1973: 25).

As theoretical knowledge becomes more central, so also do its appliers, creators and diffusers: “if the dominant figures of the past hundred years have been the entrepreneur, the businessman, and the industrial executive, the ‘new men’ are the scientists, the mathematicians, the economists, and the engineers of the new intellectual technology” (1973: 344). Bell (1973: 374, 362) concludes that “the major class of the emerging new society is primarily a professional class, based on knowledge rather than property,” and its norms, “the norms of professionalism are a departure from the hitherto prevailing norms of economic self-interest which have guided business civilization.”

Unlike Freidson, however, Bell does not anticipate a significant challenge to bureaucratic industrial authority from the technical intelligentsia.