Two Types of Bureaucracy: Enabling and Coercive

By
Paul S. Adler
and
Bryan Borys

Two Types of Bureaucracy: Enabling and Coercive

Paul S. Adler
and
Bryan Borys
University of Southern California

This article proposes a conceptualization of workflow formalization that helps reconcile the contrasting assessments of bureaucracy as alienating to employees or as enabling them to perform their tasks better. Interpreting formalization as an organizational technology, we use recent research on the design of equipment technology to identify two types of formalization—enabling and coercive. Whether the impact of formalization on employees' attitudes is positive or negative is, we argue, a function of whether that formalization enables employees better to master their tasks or functions as a means by which management attempts to coerce employees' effort and compliance. We identify some forces that tend to discourage the enabling orientation to the benefit of the coercive orientation, as well as some persistent countertendencies that encourage the enabling orientation. We suggest some ways in which this typology can be extended beyond workflow formalization to other facets of bureaucracy such as internal labor markets, hierarchy, and the role of staff functions.•

Organizational research presents two conflicting views of the human, or attitudinal, outcomes of bureaucracy. According to the negative view, the bureaucratic form of organization stifles creativity, fosters dissatisfaction, and demotivates employees. According to the positive view, it provides needed guidance and clarifies responsibilities, thereby easing role stress and helping individuals be and feel more effective. This article develops a partial reconciliation of these two views with a new conceptual model.

There is a practical need for some theoretical reconciliation. Notwithstanding the burgeoning literature on the demise of the bureaucratic form of organization (e.g., Dumaine, 1991; Heckscher and Donnellon, 1994), surveys show that the vast majority of employees work in establishments with extensive formal procedures: over 74 percent have written job descriptions, and 80 percent have rules and procedures manuals (Marsden, Cook, and Knoke, 1994). Managers of such organizations are pulled in contradictory directions by conflicting recommendations. Lawler (1994) highlighted the tensions between the recommendations of total quality management (TQM) and employee involvement (EI) currently offered practitioners. TQM's emphasis on work process codification seems to contradict EI's focus on increasing employee discretion, a contradiction similar to that between the "lean" and "team" approaches described by Applebaum and Batt (1994). The conflict between these approaches is particularly visible in the debate over appropriate organizational and job designs in repetitive operations such as auto assembly (e.g., Womack, Jones, and Roos, 1990; Berggren, 1992; Adler and Cole, 1993). Similar debates concern the organization of far less repetitive activities such as software development (Cusumano, 1991; Lecht, 1991; Soat, 1991). These debates reflect contradictory assessments of the core features of the bureaucratic form—workflow formalization, specialization, and hierarchy.

0001-8392/96/4101-0061/$1.00.

•
This research was supported by several companies affiliated with the Stanford Integrated Manufacturing Association. Research assistance was provided by Emmeline DePillis. An earlier version of this paper was presented at the 1991 Academy of Management meeting. Several colleagues have helped us clarify the argument, in particular, Chris Argyris, Warren Bennis, Ed Lawler, Dick Scott, and Bob Sutton. We owe thanks too for helpful comments from Lotte Bailyn, Daniel Bell, Alan Kantrow, Melvin Kohn, Arie Lewin, Walter Nord, George Strauss, Marcie Tyre, Bart Victor, and Mayer Zald. This version owes much to the insightful comments of Steve Barley and the referees.

We seek to identify and reconcile the valid elements of these assessments. We focus on workflow formalization and reserve for the conclusion some thoughts on how our analysis can be extended to encompass other dimensions of bureaucracy. Formalization—the extent of written rules, procedures, and instructions—is a central feature of Weber's bureaucratic ideal type and an extensively researched dimension of organizational structure (Pugh and Hickson, 1976; Mintzberg, 1979). This research, however, has started often from conflicting theoretical premises and resulted in conflicting empirical findings. We argue that this divergence reflects the fact that while research to date has focused on the impact of different degrees of formalization, it has paid insufficient attention to different types of formalization. If we interpret formalization as an organizational technology, we can draw inspiration from recent research on the design of equipment technology to differentiate two generic types of formalization—formalization designed to enable employees to master their tasks, and formalization designed to coerce effort and compliance from employees. The attitudinal outcomes are likely very different.

FORMALIZATION

Research on the attitudinal effects of formalization has generated contradictory assessments. The basic divergence can be traced back to what many commentators, starting with Parsons (1947: 58), believe to be a profound ambiguity in Weber's analysis. Weber (1947: 339) identified two very different sources of authority in bureaucracies: "incumbency in a legally defined office" and "the exercise of control on the basis of knowledge." Gouldner (1954: 22–23) believed that Weber "thought of bureaucracy as a Janus-faced organization, looking two ways at once," since on the one hand, "it was administration based on discipline," and, on the other, "an individual obeys because the rule of order is felt to be the best known method of realizing some goal." Subsequent research on the functions and effects of bureaucracy has split correspondingly, with one branch focused on its power to enforce compliance from employees assumed to be recalcitrant or irresponsible and the other branch focused on bureaucracy's technical efficiency.[1]

Negative Assessments

The coercive function of bureaucracy is highlighted if one assumes that all organization is essentially coercive because organization entails an abrogation of individual autonomy. In employing organizations, the centrality of bureaucracy's coercive function is further emphasized by the economists' standard assumption that work is a disutility. Such assumptions seem to underlie Mintzberg's (1979) assertion that formalized work procedures in "machine bureaucracies" must be imposed on employees by staff experts. The coercive function can also be posited on a less psychological and more sociopolitical foundation: neo-Marxists such as Clawson (1980) have argued that the asymmetries of power and divergence of economic interests in capitalist firms inevitably turn formalization into a coercive mechanism.

1

A third, institutionalist branch focuses on the purely symbolic functions of bureaucracy signaling submission to cultural norms of rationality, but because this branch has little to say about bureaucracy's effects on employees, we leave it aside.

Negative assessments of formalization's effects on employees' well-being abound. Rousseau (1978) studied several departments in an electronics firm and a radio station and found formalization (written rules and procedures governing employee activities) positively related to absences, propensity to leave, physical and psychological stress, and negatively related to innovation and job satisfaction. In studies of social service workers, Arches (1991) found formalization negatively associated with job satisfaction, and Kakabadse (1986) found formalization of tasks and work processes positively associated with feelings of powerlessness and self-estrangement. Bonjean and Grimes (1970) found formalization of procedures and rules positively related to self-estrangement, anomie, and a general measure of alienation for a sample of blue-collar workers.

Much of the human resource management literature is consistent with this negative assessment. In Walton's (1985: 38) "new commitment" model of HRM, for example, coordination and control are "based more on shared goals, values, and traditions," in contrast to the "traditional control model," which relies on "rules and procedures." Walton assumed that rules and procedures substitute for, rather than complement or encourage, employee commitment. The main alternatives to a coercive, command-and-control method of management are ones that are low on bureaucracy and formalization scales—organizational forms characterized variously as antibureaucratic (Bennis and Slater, 1968), as organic rather than mechanistic (Burns and Stalker, 1961), and associated with a Theory Y rather than Theory X management style (McGregor, 1960).

If formalization undermines employees' commitment and fosters dissatisfaction, it follows that it also limits innovation, since employees in formalized settings have little motivation to contribute to the complex nonroutine tasks that constitute innovation. Burns and Stalker (1961), Thompson (1965), and Bennis (1966) are emblematic of a large literature arguing that bureaucracy is an ineffective form of organization for dealing with innovation, change, and environmental complexity. Refining this global assessment, others have argued that bureaucracies do well in the implementation of innovations but poorly in the generation of innovations (Pierce and Delbecq, 1977; Zaltman, Duncan, and Holbek, 1973). Much of the literature on the sociology of scientists and engineers asserts that employees in these occupations typically aspire to high levels of autonomy in their work and that bureaucratic formalization undermines their commitment and innovation effectiveness (Kornhauser, 1962; Ritti, 1971; Bailyn, 1985; Raelin, 1985).

Positive Assessments

A second, more positive stream of research highlights the technical function of bureaucracy. Here the assumption is that work can be fulfilling, rather than a disutility, and that organization can be experienced as a cooperative endeavor rather than as an abrogation of autonomy. If employees see at least some overlap between their goals and those of the organization as a whole, they might also welcome the potential contribution of formalization to efficiency. Under

these assumptions, employees will embrace formal work procedures that are appropriately designed and implemented. Well-designed procedures would facilitate task performance and thus augment employees' pride of workmanship (Deming, 1986). Invoking or implying assumptions such as these, many writers in the operations management field, such as Deming (1986) and Schonberger (1986), have endorsed formalized systems such as statistical quality control and total quality management.

Role stress theory provides one possible underlying mechanism for a positive relationship between formalization and attitudinal outcomes (Kahn et al., 1964). Numerous studies in this vein have shown that formalization reduces role conflict and ambiguity, thereby increasing work satisfaction and reducing feelings of alienation and stress (for a review, see Jackson and Schuler, 1985). In their study of technical professionals, Organ and Greene (1981) found that the negative correlation of formalization (of standard practices, job descriptions, and policies) with role ambiguity more than offset a positive correlation with role conflict; on balance, formalization reduced feelings of alienation. Podsakoff, Williams, and Todor (1986) replicated this study for both a broader sample of professionals and for a sample of nonprofessional employees, finding that in both groups formalization reduced both role conflict and role ambiguity and thereby reduced alienation. In their study of supervisors in data processing and manufacturing, Nicholson and Goh (1983) found that formalization of tasks and work processes was negatively correlated with role conflict and role ambiguity in both samples, although the relationships were stronger for the manufacturing sample than for the data processing sample. In his study of auditing professionals, Senatra (1980) found that formalization of rules and procedures reduced role conflict even more than it reduced role ambiguity.

Other research that does not explicitly invoke role stress as the mediating variable has generated results that lean in the same, positive direction. Michaels et al. (1988) found formalization of work activities positively associated with commitment and negatively associated with alienation among industrial salespeople. Snizek and Bullard (1983) found formalization of work procedures positively related to job satisfaction among forest rangers. Stevens, Diedriks, and Philipsen (1992) found formalization of work activities postively related to satisfaction among physicians. Maslach and Pines (1978) and Pines and Maslach (1980) found that in more structured daycare programs employees experienced less emotional exhaustion.

Even the frequently asserted negative impact of formalization on innovativeness is not uncontested. In the meta-analysis reported by Damanpour (1991), the commonly hypothesized negative relationship between innovation and formalization held for most studies of service and not-for-profit organizations and for innovations of higher scope, but the preponderance of the evidence pointed to a positive, not negative, correlation between formalization and innovation in manufacturing and for-profit organizations and for both product and process innovations. Procedures appear to

facilitate innovation when they capture lessons of prior experience and when they help coordinate larger-scale projects (e.g., Craig, 1995). Scientists and engineers might prefer less formalization ceteris paribus, but if the use of such procedures to formalize the more routine parts of their task set enhances their effectiveness and their subjective self-efficacy (Bandura, 1977), they could be expected to embrace formalization.

Contingency Theory's Contribution and Limits

The divergent assessments of formalization could be resolved if it could be shown that each holds under different circumstances. Contingency theorists (Thompson, 1967; Lawrence and Lorsch, 1967; Galbraith, 1977) have taken a step in this direction by arguing that many of the previously cited models of the relationship between formalization and attitudinal outcomes are misspecified, since they control for the characteristics of neither the tasks nor the employees. The addition of these variables, we argue, clarifies but does not resolve the debate.

According to contingency theory, negative attitudinal outcomes attributed to formalization are often due to a misalignment of task requirements and organization/job design. Employees will react positively both when high levels of formalization are associated with routine tasks and when low levels of formalization are associated with nonroutine tasks. If, however, work is too formalized for the task at hand—if there are too many procedures too rigidly applied—all the outcomes invoked by the critics of formalization should be expected. The lack of autonomy and control will create feelings of dissatisfaction and demotivation. Contingency theorists have been less forthcoming about processes underlying the attitudinal effects of underformalization, but Morse and Lorsch (1970) suggested that underformalization will impair employees' sense of competence.

Unfortunately, relatively few studies have sought to control for task routineness directly, and the results of these studies are often inconclusive if only for technical reasons such as collinearity among variables (e.g., Pennings, 1975; Dewar and Werbel, 1979). With perhaps the sole exception of Engel (1969), researchers have not followed the advice of James and Jones (1976) and tested directly the hypothesis that attitudinal outcomes exhibit a curvilinear relationship to the degree of formalization for a given level of task routineness.

While empirical tests of better specified models would certainly be valuable, the contingency-theoretic account does not resolve the central theoretical issue of the controversy. It is easy enough for the critics of formalization to agree that most employees will feel relatively more satisfied performing nonroutine tasks under conditions of low formalization. The critics can also agree that the underformalization of very routine tasks will generate strain. But the critics disagree with the argument that employees will feel positively about performing routine tasks under conditions of high formalization. This, they would argue, presumes a very high degree of goal congruence between employees and

employers, a condition that the critics believe rarely obtains. For mainstream theories of organizational power (e.g., Cyert and March, 1963; Pfeffer, 1981), goal congruence is highly unlikely, since in an open system there is no mechanism to guarantee that the goals defined by a dominant coalition will be consistent with the goals of other groups in the organization. For neo-Marxists, a divergence of goals reflects an inevitable contradiction of class interests (e.g., Braverman, 1974; Edwards, 1979; Clawson, 1980).

Contingency theorists have also argued that poor employee selection is often to blame for negative outcomes attributed to formalization. If organizations performing routine tasks select employees who have only an instrumental attitude to work and manifest only low growth-needs strength, such employees will not react negatively to the extensive formalization and Theory X style of management that such tasks call for (Hackman and Oldham, 1980; Bowen and Lawler, 1992). With this argument, however, contingency theory comes close to capitulating to the critics' position, because it assumes that at best, employee selection might neutralize strong negative attitudinal outcomes. Contingency theory is essentially pessimistic in its assessment of formalization insofar as it predicts that with the appropriate employee selection, high levels of formalization in the performance of routine tasks will lead to employee motivation and commitment levels that are at best weakly positive.

TWO TYPES OF FORMALIZATION: ENABLING AND COERCIVE

Something is missing from these accounts: Surely employees' attitudes to formalization depend on the attributes of the type of formalization with which they are confronted. Organizational researchers have noted that people particularly resent what they consider "bad" rules, while "good" rules are taken for granted and rarely noticed (Perrow, 1986: 24). The variable proportion of good to bad procedures across organizations might help account for the fact that studies of formalization typically explain only a small proportion of its attitudinal impacts, reflecting the fact that employee attitudes differ considerably across organizations with comparably high levels of formalization—even in cases in which task routineness is high. Organizational theory has had little to say, however, about the criteria that shape subordinates' assessments of rules as "good" or "bad." To the extent that such a distinction is made in the literature, it is as untheorized common sense. The primary thrust of this paper is to develop a useful theory of how employees distinguish good from bad rules.

Gouldner's (1954) contrast of three different patterns of bureaucracy is a possible starting point. A pattern Gouldner called representative bureaucracy obtains when rules serve the interests of both managers and workers (e.g., safety rules). A pattern of punishment-centered bureaucracy prevails when rules serve as a means of legitimating one party's right to sanction the other in areas of conflict (e.g., rules against taking company property for personal use). And

in the mock bureaucracy pattern, rules are ignored by both parties (e.g., no-smoking rules in the 1950s). Institutionalization theory has given new impetus to research on the mock bureaucracy type (e.g., Meyer and Rowan, 1977), but the other two types are not well delineated in the available theory. In Gouldner's analysis, whether a particular rule fits the punishment, representative, or mock pattern depends on the constellation of interests in the rules' application domain: For example, if a rule governs issues in which conflict of interest obtains, it will be punishment-centered. But this insight provides little guidance for more concrete analysis, since the causal link is often the reverse of that envisaged by Gouldner: Whether in a given organization a given rule domain is conflictual depends in part on the nature of the rule at work in that context. We therefore need to understand the distinctive features of the different types of rules and to understand what distinguishes how these types are formulated and implemented. Studies of technology provide a useful guide for how to specify different types of formalization. Not only do such studies speak directly to how features, design, and implementation influence work practices, but students of technology have confronted issues similar to those surrounding the effects of bureaucracy.

Lessons from Technology

Technology is know-how that has been objectified and thus rendered relatively independent of the skills of specific actors (Cyert and March, 1963; Beniger, 1986). Know-how can be objectified in equipment and associated software programs; it can also be objectified in organizational procedures and structure. As Scott argued (1992: 31–32), "structure is formalized to the extent that the rules governing behavior are precisely and explicitly formulated and to the extent that roles and role relations are prescribed independently of the personal attributes of individuals occupying positions in the structure"; formalization thus "serves to objectify the structure." We use theories of equipment technology to help us understand formalization as an organizational technology.

In striking parallel to the two contrasting assessments of the impact of bureaucracy and formalization, two streams of research on technology have been locked in debate over whether automation leads to a deskilling and degradation of work or to an upgrading and enrichment; in philosophical terms, does objectification imply alienation or augmented capabilities? (see reviews in Adler, 1992). These debates have been marked by the very low proportion of variance in skill structures and attitudinal outcomes explained by technology variables.

More recent automation research has sought to increase explanatory power by distinguishing among types of automation. One distinction has emerged as decisive in much of this recent research: Equipment can be designed with a fool-proofing and deskilling rationale, aiming to reduce reliance on more highly paid, highly skilled, and powerful workers (Perrow, 1983); alternatively, it can be designed

with a usability and upgrading rationale, aiming to enhance users' capabilities and to leverage their skills and intelligence. The contrast in design rationales—alternatively, design logics, strategies, or philosophies—has been labeled variously deskilling vs. usability, technology-centered vs. user-centered, systems design vs. tool design, technology-based vs. skill-based, technocentric vs. anthropocentric, or automating vs. informating (e.g., Adler and Winograd, 1992; Salzman and Rosenthal, 1993; Zuboff, 1988). According to one rationale, the user is a source of problems to be eliminated; according to the other, the user is a source of skill and intelligence to be supported. In one, labor is a source of error and the goal of design is to get the operator out of the control loop; in the other, equipment is seen as inherently limited and the goal of design is ensure the operator can intervene effectively to rectify problems.

Xerox photocopiers provide an interesting example of the emerging principles of equipment design for usability.[2] During the 1970s, Xerox photocopiers grew vastly more sophisticated in their functionality. As a result, even simple tasks such as copying, loading paper, and resupplying ink became more complex, and recovery from routine problems such as paper jams became more difficult. It became increasingly common for users to walk away from the machine rather than waste time trying to work out how to clear a paper jam or replace the ink supply. This resulted in unnecessary downtime and expensive service calls.

One option for Xerox was to focus on perfecting the machine so that it never required any user intelligence. Historically, this had been engineering's goal, and at one point Xerox had even used a television commercial showing a monkey successfully using a Xerox copier. Notwithstanding Xerox's enormous technical capabilities, that goal proved utopian. People sometimes make mistakes and machines sometimes break down, and as the machines became more complex, the fool-proofing goal became ever-more remote. A second option was to rely on specialized operators and provide them with ever-longer training programs. That option ignored the growing number of office workers who were impressed by the ease of use of Japanese copiers and wanted to make their own copies more quickly than was possible with big, remote copy centers.

Xerox adopted a third way. It redesigned its copiers with the goal of creating a system that mobilized rather than replaced users' intelligence. To reach this goal, the design process was managed in a new way. Instead of using a minimal number of prototypes to confirm technical choices, the design team used many successive prototypes to create an on-going dialogue among users, designers, and business decision makers. This prototyping process helped to identify emergent design issues and opportunities.

The resulting design was very different from the traditional fake-cabinetry box. Through its physical structure and the displays it offered, the machine provided a succession of informative views of the copier's functioning and of the user's interaction with it at various stages of the copying experience. As the views unfolded, they helped users form

2

The following account draws extensively on Rheinfrank, Hartman, and Wasserman (1992).

mental models of the machine's subsystems and of the experience of interacting with those subsystems. The views included step-by-step presentations of machine subsystems, their functions, and the corresponding task sequences. The views supported copying tasks by talking the user through them—neither concealing information nor overloading users with incomprehensible or unrelated information. The interiors, for example, were designed to express various layers and degrees of interaction to users and service people. The user-accessible components of the interiors (such as paper loading, jam clearing, and simple maintenance) were placed in the foreground of the visual field, and the technician-accessible components of the interior (for more complex maintenance and repairs) were placed in receding layers in the background. Color and value coding were used to indicate the various layers of interaction.

The goal was to design successful interactions between people and copiers rather than to design foolproof copiers, to help the user operate the system efficiently rather than only to protect the user from breakdowns. Mistakes and breakdowns can be opportunities for learning. When the machine was designed to facilitate that learning, users understood effortlessly how to recover from paper jams. Even if paper jams happened just as frequently, they became much less of a problem for users.

The parallels to the design of organizational technology are strong. Formal procedures do not have to be designed to make the work process foolproof. They can be designed to enable employees to deal more effectively with its inevitable contingencies. In what we call the enabling type of formalization, procedures provide organizational memory that captures lessons learned from experience (Levitt and March, 1988; Walsh and Ungson, 1991). Formalization codifies best-practice routines so as to stabilize and diffuse new organizational capabilities (Nelson and Winter, 1982). The idea of an enabling type of formalization is consistent with Blau's (1955) finding that "good" procedures are those seen as valuable resources that help professionals meet clients' needs.

By contrast, in what we call the coercive type of formalization, procedures fit Walton's (1985) characterization: They are a substitute for, rather than a complement to commitment. Instead of providing committed employees with access to accumulated organizational learning and best-practice templates, coercive procedures are designed to force reluctant compliance and to extract recalcitrant effort.

Mintzberg's (1979) image of a machine bureaucracy thus conflates images of two very different kinds of machine—machines designed to deskill work and those designed to leverage users' skills. Interpreting workflow formalization as an organizational technology, and using research such as Xerox's on equipment design for usability, we can contrast enabling and coercive types of formalization along three dimensions: (1) the features of the system, (2) the process of designing the system, and (3) the implementation of the system. The characteristics of

procedures, whether they are enabling or coercive, depend directly on their features and on how the procedures are implemented; the features themselves are influenced by the design process and the goals that govern it.

Features of Enabling and Coercive Formalization

Research into equipment design reveals four generic features that distinguish deskilling from usability approaches: repair, internal transparency, global transparency, and flexibility. Each has strong parallels in the domain of procedure design. As suggested by the Xerox case, the common underlying thread is the need to help users form a mental model of the system they are using. If systems break down or if users make mistakes, such mental models enable users to regain control; if the system can be improved, they enable users to formulate and evaluate suggestions for improvement. In the deskilling approach, these mental models are superfluous, because employees are expected merely to follow explicit instructions.

Repair. When managers fear the opportunism of employees more than they value their potential contribution to dealing with unexpected breakdowns and identifying opportunities for improvement, they will adopt a deskilling approach and design equipment so as to reduce the possibility of shirking. They will separate routine production tasks from nonroutine repair and improvement tasks and assign each task to different categories of employees. In many machining shops, the machine control panel is locked shut to prevent operators from meddling with the part programs (Howard, 1985). In the event of unexpected breakdowns, production employees need to call a specialized technician, and they endure the resulting performance deficit and the associated stress. The suggestions of workers who notice opportunities for improvement will receive lower priority than engineering-driven projects. Under such a regime, production employees inevitably will reciprocate management's lack of trust, breakdowns will become welcome respites that are deliberately created and prolonged, and the flow of suggestions for improvement will dry up.

In a usability approach, using equipment is seen as something like a dialogue. In two-way communication, understanding advances partly through the repair of misunderstanding. The repair of conversational breakdown is often so easy and so natural that it remains invisible (Brown and Duguid, 1992). Equipment, like conversation, often breaks down. One characteristic of highly usable systems is thus the ease with which users can repair the process themselves rather than allowing the breakdown to force the work process to a halt. Alexander (1964) discussed the merits of mud over more durable materials in allowing easy changes to the design of housing structures. A parallel can be found in the "undo" commands available in more usable computer software systems, making errors easy to correct. Similarly, rather than allowing operating problems to interrupt the flow of work by forcing the user to consult a manual or a supervisor, more usable computer systems have built-in on-line "help" facilities.

In the coercive logic of procedure design, any deviation from standard procedure is seen as suspect. Procedures are designed to highlight to superiors whether subordinates' actions are in compliance. The procedures are not designed to help subordinates determine whether the process is operating well, nor to help them navigate the inevitable contingencies of the real work process, nor to help them identify improvement opportunities. In one organization we studied, proud of its recent certification as conforming to the ISO9000 international quality assurance standard, engineers write procedures, then hand them to employees, who must sign them as if they constituted a contract. The rationale offered by management is that this ensures an audit trail in case of quality problems. From the employees' point of view, the arrangement is experienced as "a way for the higher-ups to cover their asses." The procedure is neither designed nor implemented as an aid for the user; in the words of one worker: "Sure the engineers discuss the procedure with us. But it's not like we get to discuss it with them." As a result, covert and inefficient "work-arounds" abound.

Traditional time-and-motion analysis often operates in practice in this coercive way. Industrial engineers use handbooks to determine an optimal work method by breaking the task into its constituent gestures. They add up the associated elementary times and add predetermined allowances for contingencies and fatigue to determine a "standard time," then instruct the worker to use the prescribed method to perform the task within that standard. Since the prescribed methods were determined from a handbook by engineers ignorant of real production conditions and contingencies, foremen under production pressure prefer to leave workers to improvise their own methods, and all that remains of the original analysis is the time standard, which serves as a coercive control to highlight shirking (see Adler, 1993, on the traditional approach as found in auto assembly plants).

The enabling logic, in contrast, generates procedures that facilitate responses to real work contingencies. Breakdowns and repairs signal to the organization problems with the formal procedures and become opportunities for improvement. Toyota's "standardized work" process provides a salient contrast with traditional industrial engineering practice. Toyota's focus is not on standards (allotted times) but on methods. As used at the NUMMI plant in Fremont, California, for example, the standardized work process brings workers and supervisors together to define cooperatively and to document in great detail the most effective work methods and task allocations. Workers time themselves and conduct their own analysis of the real work process. The methods engineering staff and the associated handbooks have been eliminated. Strong formal and informal incentives encourage workers to identify and propose improvements in methods. Deviations from the detailed, prescribed methods signal either the need for further worker training or the need to revise the inadequate standardized work methods. In this context, the TQM dictum

"You can't improve a process that hasn't been standardized" becomes a philosophy of collaborative learning (Adler, 1993).

Internal transparency. When equipment is designed to reduce reliance on users' skills, there is little reason to provide users with any visibility into its internal workings. In a deskilling approach, equipment status information is presented only in the event of machine malfunction, and then it is presented in a language familiar to the technical staff but not the operator. In a usability approach, in contrast, it is expected that users will be confronted with unforeseen contingencies and will therefore need to interact creatively with the equipment. Users need both an understanding of the logic of the equipment's internal functioning and information on the equipment's status. Equipment should manifest what could be called internal transparency, or glass-box design (Wenger, 1988; Brown and Duguid, 1992). In a usability approach, system status information is available on demand. Machine control software is presented in a way that is intelligible to the operator, and the operator can edit these programs to rectify errors. It is important not to overload the user with unnecessary system information: As the photocopier example shows, layered access is the key. "Transparency" and "glass box" can therefore be misleading images.

Procedures designed in a coercion logic are formulated as lists of flat assertions of duties. They are not designed to help employees so much as their supervisors. They do not seek to guide the employee's efforts so much as sanction punishment in the case of deviations. The ISO9000 procedures in the organization cited above did not provide operators with the rationale for the work procedures. The worker was expected merely to implement the work instructions. Their rationale was the province of the engineer.

In contrast, enabling procedures provide users with visibility into the processes they regulate by explicating its key components and by codifying best-practice routines. They provide users with an understanding of the underlying theory of this process by clarifying the rationale of the rules. And they provide users with feedback on their performance by providing metrics that help users assess their performance against historical standards. In a product development procedure that specifies a set of documents required at each phase, an enabling-type manual can provide copies not only of the blank forms for these documents but also the "best example to date" from the organization's prior projects. In this scenario, the manual becomes a working tool, a resource that is open permanently on the engineer's desk, rather than a set of hurdles that are circumvented covertly. In one organization we studied, there is a friendly rivalry among design teams, each vying for the honor of getting their team's documents into the next revision of the manual as best-to-date templates.

Global transparency. Internal transparency refers to internal functioning of the equipment or procedure as used by employees; global transparency refers to the intelligibility for

employees of the broader system within which they are working. The global transparency valued in a coercion logic is decidedly asymmetrical, as exemplified by Bentham's Panopticon: a prison in a wheel-like layout in which the warden is located in a tower at the central hub and the cells are located on the wheel's rim; corridors connect the tower and the cells like so many spokes of a wheel, affording the warden full visibility into each cell but simultaneously shielding the warden from the prisoners' sight and isolating the prisoners from each other (Foucault, 1977). This approach is often found in computer-integrated manufacturing environments, in which supervisors staff the control room, operators have access to information only on the specific machine they are responsible for supporting, and broader system status information is distributed on a restrictive need-to-know basis.

In contrast, other organizations adopt a usability approach to equipment design. Their computer-control technologies are programmed to provide operators with extensive information on the status of the broader production process. Operators anywhere on the line can call up production and quality data for any station. Workers' understanding of the entire process is considered a valuable resource both in their efforts to optimize the performance of the part for which they are directly responsible and in their contributions to identifying local and systemwide opportunities for improvement (Zuboff, 1988).

In a coercive approach to procedure design, global transparency for subordinates is a risk to be minimized. Tasks are partitioned, and if employees "move beyond their specific realms" they are told, "That's not your job" (Heckscher, 1994: 20). Some suggestion systems exemplify this approach. In some organizations, suggestion systems are designed primarily to identify a small number of high-payoff proposals. Relying on the motivating power of large rewards for a very small proportion of submitted suggestions, management is concerned with retaining full control over their acceptance or rejection. The suggestion procedure itself is thus left largely opaque to employees. An employee who submits a suggestion has no clear idea who will evaluate it, according to what criteria, where in the evaluation cycle the suggestion is on a given date, or why it was ultimately approved or rejected.

In an enabling approach to procedure design, by contrast, employees are provided with a wide range of contextual information designed to help them interact creatively with the broader organization and environment. Procedures are therefore designed to afford them an understanding of where their own tasks fit into the whole. The suggestion system at NUMMI, for example, is seen as part of a broad program of employee skill development and employee involvement. It is therefore designed to encourage a large number of suggestions, including many with only very small payoffs. As a result, the suggestion procedure is explained in considerable detail to all employees. Explanations of evaluation criteria are seen as opportunities to broaden employees' understanding of the production system. An understanding of the review process and the ability to

identify the status of a given suggestion under review are considered essential to motivating continued participation.

Flexibility. The deskilling logic results in machines that are designed to minimize reliance on users' skill and discretion. Operators carry out those functions that cannot be automated. The machine takes the controlling decisions after the operator has entered the required data. The machine issues commands that operators implement (Clegg and Corbett, 1987). The usability logic results in machines that are programmed to give advice and make suggestions, and users take the controlling decisions after the system displays the requisite data. Users can choose to retain control or can hand off control to the machine. Aircraft autopilot systems are designed in this way, but factory equipment rarely so. When designed to support users' intelligence, word-processing and computer-aided design systems are easily customized for experts or novices by offering experts short-cut keystroke commands as an alternative to menus. Flexible systems encourage users to modify the interface and add functionality to suit their specific work demands.

The same ideas can inform procedure design. The coercive procedure manual defines in detail the specific sequence of steps to be followed in the product-development process and forces the employee to ask for the superior's approval for skipping steps unnecessary for the specific project at hand. The assumption is that the manual prescribes, the employee implements, and only the supervisor can authorize a deviation.

An enabling procedure manual assumes that deviations are not only risks but also learning opportunities. In one organization we studied, the engineering change process—a very complex procedure for making minor changes to existing product designs—was redesigned along these lines (Borys, 1992). A task-force charged with designing a new procedure found that under time pressure, engineers sometimes covertly skipped certain steps in the existing procedure. Closer analysis revealed that in some cases these steps could indeed be safely skipped. So the new procedure specified four distinct processes with guidelines on how to choose the appropriate one, with the result that the engineers could now take short-cuts without resorting to work-arounds.

Formulating Enabling or Coercive Procedures

In the deskilling logic, equipment design is left to the technical experts. There is little to be gained by involving technically untrained users in the design process, and such involvement risks politicizing the process. This is the more traditional approach. Salzman (1992) reviewed over 100 U.S. books on equipment design and 100 textbooks used in U.S. engineering design courses and found not one discussion of the possible advantages of user involvement in designing sytems. If, however, the rationale underlying design is usability, the design process will be managed very differently. The literature on the usability assurance process suggests four key process imperatives well illustrated in the Xerox case: an early and continual focus on users, an

integrated view of the various aspects of usability, early and continual user testing, and an iterative design process that allows for progressive improvement (Gould, 1988). User involvement in the design of equipment can be an important mechanism for both building a subjective sense of "buy-in" and improving the technical quality of the system (Corbett, Rasmussen, and Rauner, 1991; Leonard-Barton and Sinha, 1993; Ives and Olson, 1984).

Such lessons carry over to the design of formal procedures. The literature on participative decision making suggests that at least in some conditions, employee participation improves morale and performance (Cotton et al., 1988, 1990; Leana, Locke, and Schweiger, 1990). Depending on the relevance of the procedures to the employee, and assuming that the employees are given the appropriate training and resources, employee involvement in the formulation of procedures is likely to have a positive effect on both attitudinal and technical outcomes. If, as in the scenario hypothesized by Mintzberg (1979), staff analysts formulate procedures in distrustful isolation from line employees, it is not surprising that those employees resist the resulting system. At NUMMI, workers develop standardized work procedures themselves. According to a worker at NUMMI who had previously worked at a General Motors facility on the same site:

> "The GM system [of job design] relied on authority. People with rank—the managers—ruled regardless of their competence or the validity of what they were saying . . . . At NUMMI, rank doesn't mean a damn thing—standardized work means that we all work out the objectively best way to do the job, and everyone does it that way. I might make some minor adjustments because of my height, for example, but I follow the procedure we've laid out because it makes sense. . . . Management has delegated responsibility to the people who do the work and that gives workers a sense of pride in their jobs." (Adler, 1993: 145)

Implementation for Enablement vs. Coercion

A long tradition of research has attempted to formulate robust generalizations about the impact of new technologies, assuming that when organizations implement a new technology they adapt their structure to use it effectively (see reviews in Gerwin, 1981; Scott, 1990; Adler, 1992). Other authors have challenged what they see as an implicit technological determinism in this research stream. These critics have argued that the implementation of a given technology has no determinate effects on organizational or attitudinal outcomes because technological change is primarily an opportunity for various social forces to play out another round in their rivalry. The thrust of this indeterminacy thesis is reinforced by research showing that implementation is typically accompanied by modifications that adapt the technology to local technical and social conditions (Sahal, 1981; Leonard-Barton and Sinha, 1993). A plausible middle ground was charted by Corbett (1992), who argued that some technologies, and some aspects of any given technology, are less organizationally constraining and more technically malleable than others; he therefore characterized the nature of the impact of technology on work organization as "soft determinism."

This determinism is in general softer for organizational technologies than for equipment. One of the differences between equipment technology and organizational technology is that the former is typically imported into the organization—through purchase from a supplier, for example—while the latter is typically developed internally. Whereas equipment suppliers typically sell to a range of customers and thus design their products to fit a generic user profile, the procedure design process and the procedure's features are typically shaped by the specific implementation context right from the outset. And even if the procedure design team tries to change the broader organization by taking a new, enabling orientation, a procedure designed with an enabling intent and embodying enabling features can be implemented coercively. In one company we studied, a comprehensive tracking and reporting system was designed to render more transparent the engineering change process. After several months and under pressure to improve the timeliness with which engineering changes were processed, some managers began using it coercively to cajole their own department's engineers and to disparage managers from other rival departments. The senior manager intervened, fearful that the coercive use would lead to covert game playing: "We have to ensure that these procedures are used as tools, not weapons."

Scattered prior research suggests some characteristics of the implementation contexts likely to preserve and enhance the enabling potential of formalized procedures. Weber's (1978, v.2: 968) discussion of bureaucracy in *Economy and Society* identifies some:

> According to experience, the relative optimum for the success and maintenance of a rigorous mechanization of the bureaucratic apparatus is offered by an assured salary connected with the opportunity of a career that is not dependent upon mere accident and arbitrariness. Taut discipline and control which at the same time have consideration for the official's sense of honor, and the development of prestige sentiments of the status group as well as the possibility of public criticism also work in the same direction. With all this, the bureaucratic apparatus functions more assuredly than does legal enslavement of functionaries.

Blau's (1955) discussion of adjustive development updates and refines Weber's characterization. He defined adjustive development as the emergence of practices that solve incipient operational problems, practices developed by employees in the course of their work that were not deliberately instituted by superiors. Such adjustive development was the hallmark of an effective bureaucracy. He identified five prerequisites for it: a minimum of employment security, a professional orientation toward the performance of duties, established work groups that command the allegiance of their members, the absence of basic conflict between work group and management, and organizational needs that are experienced as disturbing. These features all seem strikingly salient in organizations such as NUMMI that make extensive use of enabling formalization to support the process of adjustive development they call continuous improvement or *kaizen*.

The analysis of such organizations (Adler, 1993) suggests that to Blau's list of preconditions, we might add employee voice (to ensure that the absence of conflict is not merely passive acquiescence), employee skills (to ensure that employees can respond effectively to disturbances), and process control (to ensure a concrete foundation for improvement efforts).

Blau's notion of adjustive development also points to the importance of flexibility in the implementation context as distinct from the flexibility of the procedures themselves. His point is reinforced by Gaines and Jermier's (1983) finding that formalization of tasks and work processes correlated only weakly with emotional exhaustion among police officers and support personnel, but management's flexibility in interpreting the procedures was a strong predictor of officers' exhaustion.

Flexibility in changing the procedures is also important. Coercive procedures, like coercive equipment designs, are difficult to change, because users have neither the knowledge nor the incentive to facilitate change and because designers and users will interpret changes as risks to the established power balance. In the U.S., Big Three auto assembly plants avoid changing line speeds because every time they do so, industrial engineers need to recalibrate every workstation and foremen need to renegotiate work requirements with every worker. By contrast, Toyota plants in Japan change line speed every month as a function of the sales forecast, and they use these changes as opportunities to mobilize the whole workforce to revise their standardized work sheets.

A Typology of Organizations

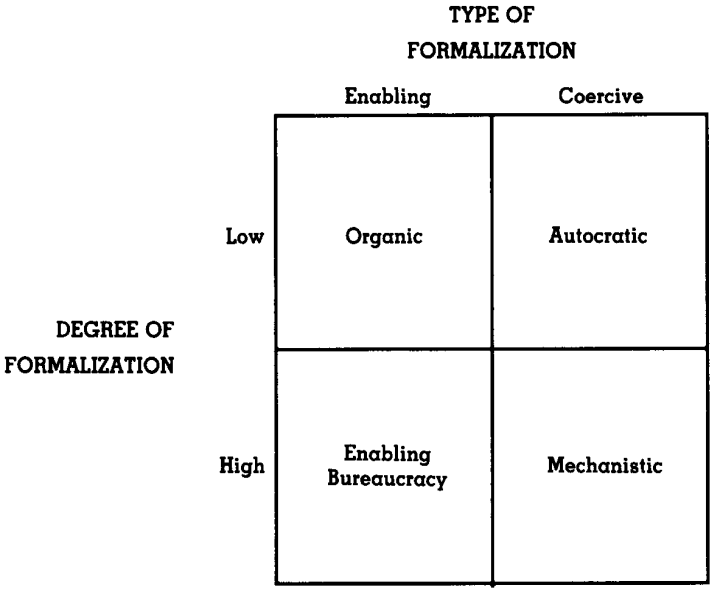
Distinguishing between enabling and coercive types of formalization seems potentially fruitful as a way to theorize the difference between good and bad procedures as experienced by employees. They are likely to have different features, and these features are more likely to emerge through different design processes. To preserve and augment their enabling or coercive potential, they need to be implemented in different organizational contexts.

The enabling versus coercive distinction suggests that we can characterize organizations along two dimensions: type and degree of formalization. The type of formalization can be conceptualized in the terms we have just identified. The degree of formalization can be conceptualized in the now-conventional terms of the Aston group (Pugh and Hickson, 1976) or Hall (1963), as the extent of formalized rules governing work behavior and the extent to which they are enforced. This two-dimensional framework implies that formalization's attitudinal outcomes depend both on the fit of the degree of formalization with the routineness of the task, as argued in contingency theory, and on the type of formalization. Positive attitudinal outcomes, we submit, can be expected in organizations with a high or low degree of (technically required) formalization as long as the type of formalization is enabling. Negative outcomes are to be expected in organizations with a high or low degree of

(technically required) formalization whenever the type of formalization is coercive.

Figure 1 summarizes the resulting typology of organizations, with, on one dimension, the degree of formalization that is required by the routineness of the task and, on the other dimension, the type of formalization. We have simplified the representation by dichotomizing both dimensions. In reality, of course, both the degree and the type of formalization are continuous variables. Between coercion and enablement lie those types of formalization that fit Barnard's (1938) notion of a "zone of indifference," in which formalizations arouse neither positive nor negative responses.

Figure 1. A typology of organizations.



In this representation, the conventional contrast between organic/nonbureaucratic and mechanistic/bureaucratic organizations appears as the relationship between two cells on a diagonal. Many of the asserted negative attitudinal effects of the bureaucratic and mechanistic form now appear as the result of a specifically coercive type of organization. The other diagonal contrasts the enabling-bureaucratic and the autocratic forms of organization. The former is the model we cull from the NUMMI case. The latter corresponds to the model of simple control described by Edwards (1979) and can be found in despotic as well as paternalistic variants (Burawoy, 1985: ch. 2).

This two-dimensional design matrix overcomes two problems with the conventional, one-dimensional contrast of organic and mechanistic/bureaucratic forms of organization. First, in the context of routine tasks, the conventional contrast assumes that formalization is at best a necessary evil and that organizations must reduce formalization—and forgo the associated efficiencies—to achieve high motivation

and satisfaction levels. The empirical research reviewed above shows that this negative assessment of formalization's attitudinal impact is not a viable generalization. The high formalization row of the matrix shows that organizations undertaking very routine tasks can engender high or low levels of motivation and satisfaction depending on the type of formalization. The conventional contrast embodies the pessimistic "metaphysical pathos" denounced by Gouldner (1955)—an unsubstantiated feeling that bureaucracy's efficiency necessarily comes at the expense of employee well-being.

The second advantage of this expanded typology is that it renders intelligible changes we observe in less routine operations, in particular, professional, knowledge-intensive, innovative organizations that are under competitive pressure to reduce costs, increase timeliness, and improve quality. Positions in such organizations typically involve a mix of routine and nonroutine tasks. The conventional view suggests that such mixed situations create an organization design dilemma because the routine parts cannot be managed in a mechanistic, coercive, and bureaucratic way at the same time and for the same employees as the nonroutine parts are managed in an organic and empowering way. The motivational underpinnings for employees and the requisite attitudes and behavior for managers are incompatible, like oil and water (Heckscher, 1994: 45). Closer analysis of effective innovators shows that this dilemma is a figment of our impoverished theoretical imagination. Cusumano (1991) documented apparently successful efforts to turn software development into a factory-like process without alienating the software developers. At Toshiba's Fuchu Works software factory, for example, development methodologies are extensively formalized and standardized, and projects are tracked daily for performance with respect to targets of cost, output, and software reuse ratios. Similarly, Jelinek and Schoonhoven (1993) analyzed several U.S. electronics firms and showed that some make extensive use of highly systematic procedures and detailed formalized disciplines in their strategic management and product development processes. While in one case (Texas Instruments in the early 1980s) this formalization went awry and became coercive and alienating (1993: 80–83), in several other cases (such as Motorola), equally high levels of formalization supported high levels of commitment and innovation.

The enabling column in the organization design matrix permits us to understand such hybrids. Once routine and nonroutine tasks are both managed in an enabling way, the organization can become effectively ambidextrous (Duncan, 1976; McDonough and Leifer, 1983). In organizations such as Toshiba, and Motorola, jobs effectively mix organic and enabling-bureaucratic features, allowing employees to switch easily between routine and nonroutine tasks. The innovation goals of these organizations are supported by their enabling-organic features while their efficiency and control requirements are supported by the collaborative, shared control afforded by their enabling-bureaucratic features. Even organizations whose core tasks are essentially routine, like

NUMMI, can use the same ambidextrous approach—varying, of course, the relative proportions—to enable workers to switch between production tasks and quality-circle activity.

The key flaws underlying the conventional view are twofold, one psychological and the other sociological. The psychological flaw lies in the conventional dichotomization of motivation into extrinsic and intrinsic. Assuming such a dichotomy, contingency theorists join many of the critics of formalization and are led down the following chain of logic: First, in organizations with high levels of formalization, work does not afford the levels of task identity and autonomy required for intrinsic motivation; second, such organizations must therefore rely on purely extrinsic motivation based on threats and rewards; and third, to avoid strongly negative employee responses, these organizations should recruit employees with low growth-needs strength and an instrumental attitude to work. We challenge the second step. Ryan and Connell (1989) showed that intrinsic and extrinsic are merely two poles of a spectrum characterizing varying degrees of internalization of values. There are at least two intermediate points: "introjection," based on avoidance of guilt or search for approval, and "identification," based on an internalization both of goals and of the discipline necessary to reach them. An enabling type of formalization is one that encourages motivation based on identification. Ryan and Connell cited education research suggesting that the identified form of motivation has positive effects very similar to those of intrinsic motivation in improving conceptual learning and recall, reducing anxiety, encouraging more positive and less negative coping with failure, and improving task performance.

The sociological flaw in the conventional view lies in its view of organizational goals. In our discussion of the divergent assessments of formalization found in prior research, we indicated this divergence was rooted in different conceptions of the origins and functions of organization as cooperative endeavor or negation of individual autonomy. But these different views apply in different situations. When the organization's goals diverge from those of employees, the enabling type of formalization is unavailable. Among other reasons for this is that the psychological conditions for identification are absent. When organizational goals are salient to the employees, employees no longer experience formal procedures for routine work as a negation of individual autonomy but as a valuable means to a desired end. Goal congruence is thus a critical contingency.

FORCES SHAPING FORMALIZATION CHOICES

If goal congruence is a critical contingency, it could be argued that the choice between types of formalization is overdetermined by broader and deeper structural forces. Neo-Marxists, for example, would argue that given the antagonistic nature of class interests and the overall balance of class power, such congruence is ephemeral or illusory, and the enabling type is thus a mere mirage (e.g., Parker, 1985; Parker and Slaughter, 1988). Conversely, authors following in the line of Barnard (1938) define organizations as

vehicles of cooperative effort, therefore assume that goal congruence is high, and argue that it is the coercive type that is ephemeral. Waring (1991) argued that much of Drucker's writing is premised on an assumption of this kind. If our design-focused theory of bureaucracy is to retain any purchase on reality, we must therefore address the possibility that deeper forces dictate the outcome and that one or another organizational form is merely an ephemeral epiphenomenon. To do this, we focus on the forces shaping the choice between types of formalization.

Forces Encouraging the Coercive Logic

Asymmetries of power in the organization. Asymmetry of power between managers and employees allows managers to play a dominant role in shaping the extent and type of formalization. The same asymmetry allows people in higher positions in the organizational hierarchy to deflect attribution of responsibility for negative outcomes down the hierarchy more easily than subordinates can deflect responsibility upward; conversely, subordinates can less easily claim credit for positive outcomes. In organizations characterized by greater asymmetry, we can therefore hypothesize that the enabling logic will tend to appear utopian and naive and that the coercion logic will appear as inevitable.

Asymmetries in the distribution of other resources also play a role in encouraging the coercive type. Lawler (1992) identified four dimensions along which the high-involvement organization requires extensive decentralization: power, knowledge, skills, and rewards. Unlike Bowen and Lawler (1992), we argue that such decentralization can be very effective not only for organizations performing nonroutine tasks but also for highly formalized, bureaucratic organizations performing routine tasks. The enabling approach requires and encourages a reduction in disparities of power, knowledge, skills, and rewards between managers and subordinates. To the extent that the dominant pattern in U.S. industry remains one of centralization along these four dimensions (Lawler, Mohrman, and Ledford, 1995), the diffusion of the enabling form of bureaucracy is hobbled.

Institutionalized employee voice—in the form of unions, works councils, or nonunion employee representation schemes—would appear to be not only a corollary of but also a necessary condition for the reduction of all four kinds of asymmetry. This condition, however, is increasingly rare. It would require a relatively rare degree of integrity, abnegation, and high-minded altruism on the part of the current beneficiaries of these asymmetries to dismantle them unilaterally and to initiate and sustain an enabling orientation in organizational design. The responsibility for creating the incentives for such a change lies largely in the broader political and legal context. Notwithstanding the growth of more circumscribed individual and small-group participation mechanisms such as quality circles, collective-voice institutions that allow participation on a broader, organization-wide scale seem to be on the wane in the U.S. (Lawler, Mohrman, and Ledford, 1995) as in many, although not all, Western societies. Moreover, where these more robust forms of collective voice are found, they may facilitate

but clearly do not guarantee the dominance of the enabling orientation (e.g., Crozier, 1964).

The absence of reality checks. As discussed above, Weber and Blau argued that an external stimulus for improvement is a key precondition for maintaining the virtuous cycle of adaptive adjustment. When organizations lack the compelling "reality check" provided by competitive rivalry or by demanding customers or clients, they tend to become inwardly focused, and parochial conflict takes on greater salience than common interests vis-à-vis competitors, clients, or customers (Pfeffer and Salancik, 1978). This context favors the coercive (or mock) form of bureaucracy over the enabling form. The vicious circle described by Crozier (1964) fed, in part, on the vacuum created by the lack of performance pressures in the governmental monopolies he studied.

Suggestive indirect evidence for this proposition is found in Damanpour's (1991) meta-analytic result that formalization is correlated positively with innovation in for-profit organizations but negatively in not-for-profit organizations. Subject to empirical confirmation, it seems plausible that for-profit (vs. not-for-profit) status is correlated, albeit only approximately, with the greater salience of external common goals. More generally, we can conjecture that the enabling orientation is less likely to diffuse among organizations that are buffered from task performance pressures.

The presence of strong reality checks is, however, no guarantee of an enabling orientation. In the presence of marked power, information, knowledge, and reward asymmetries, such checks can be interpreted as legitimizing those asymmetries and authorizing a more coercive orientation. Organization theorists have long asserted that under conditions of environmental threat, centralization is more efficient.

Countervailing Forces that Encourage the Enabling Logic

The mechanisms just discussed and the resulting entrenchment of the coercive logic suggest that the space for the emergence of enabling formalization is quite limited. But while the deck is stacked, the outcome is not entirely predetermined. Three countervailing tendencies might authorize a cautious optimism. First, the enabling logic has considerable and growing legitimacy in the broader culture. In U.S. society today—and leaving other cultural contexts to future research—the coercion logic tends to be pursued behind the scenes. Its explicit invocation exacerbates conflict. In public discourse, it is the enabling logic that is invoked more confidently and more often. The coercive logic is often presented as inevitable, sometimes as a necessary evil, but rarely as a positive good. This suggests one reason why procedures designed with subordinate participation are less coercion-oriented: The forum created by such participative design processes creates a context much closer to the ideal speech situation described by Habermas (1984) in which consensus is sought by rational argument, and participants acknowledge the right of each to participate in the dialogue as autonomous and equal partners. The

obligation to address users' concerns publicly and explicitly encourages designers to rely on the relatively more legitimate enabling logic.

Second, the advantages of the enabling logic can be bolstered by the demands of the task environment and notably by the intensification of competitive pressure. Such pressure forces organizations to seek out opportunities to improve performance, and sometimes this search legitimizes a change in the distribution of power. The coercive and mock modes pay a significant opportunity cost in asking employees to "check their brains at the door." It is true that performance pressure is sometimes invoked as a rationale for the coercive mode, but the argument, once engaged, is not easily won. In very repetitive operations such as auto assembly, in which formalization is clearly indicated, the experience of the leading Japanese auto companies suggests that considerable competitive advantage can be gained by adopting an enabling form and thus encouraging employee commitment (Womack, Jones, and Roos, 1990). Even in the context of semiconductor fabrication lines—where most innovation is engineering-led and the process technology requires extensive formalization of work procedures—recent research suggests that there are considerable performance advantages to a high-involvement form of organization with extensive operator participation (Brown, 1994).

Third, automation often increases the relative advantage of the enabling form. Notwithstanding the debates referred to earlier on the impact of automation, it is clear that at least some and perhaps most forms of automation are more effectively deployed when the associated work procedures are of the enabling type. With higher levels of automation, contingencies become harder to predict, and downtime is more expensive. Routine operations are incorporated into the automatic system, leaving operators with a higher proportion of learning tasks to doing tasks. Performance pressure encourages firms to use more advanced automation and thus to design jobs that require more skill and discretion and thus, in turn, to implement work procedures that empower users (see reviews in Adler, 1992). As automation levels rise, the degree of formalization required may be reduced, but at the same time the relative advantage of the enabling over the coercive type of formalization probably increases.

These forces favoring the enabling orientation coexist with the formidable forces that favor coercion. Lacking compelling evidence of or argument for the dominance of one force over the others, we conclude that the choice between types of formalization is not merely an illusion whose outcome is dictated by underlying structural factors. The relevant internal and external structural factors cut both ways, and the outcome is the object of an ongoing struggle.

CONCLUSION

Enabling procedures help committed employees do their jobs more effectively and reinforce their commitment. Leveraging the parallel between equipment technology and formalization as an organizational technology, we have

characterized the features, the design processes, and the implementation contexts that differentiate such procedures from their coercive counterparts. We believe that the resulting typology of organizations opens the way to a less caricatured and more useful discussion of the range of available organizational forms. The dilemmas created by the organic/mechanistic contrast are largely illusory. If the bureaucratic form is only discussed in its disfigured variants—synonymous with rigidity, goal displacement, and authoritarian command and control—our ability to grasp the changes taking place in the organizational landscape is terribly limited.

Our argument suggests several directions for future research. First, while this article has focused on workflow formalization, the enabling versus coercive distinction seems potentially fruitful in the analysis of other facets of bureaucracy, in particular, the bureaucratized employment relation, the nature of hierarchy, and the role of staffs.

The bureaucratization of the employment relation in American firms created internal labor markets, which, according to Edwards (1979), functioned essentially as a means by which managers could divide and exploit workers. Dore (1973), by contrast, argued that the bureaucratization of Japanese employment relations enhanced employee commitment through the creation of a constitutional order that buffered subordinates from arbitrary power and legitimized authority. This divergence between bureaucratic alienation and welfare corporatist theories of bureaucracy is described but not resolved by Lincoln and Kalleberg (1991). Jacoby's (1985) history of the bureaucratization of American personnel management takes a stance similar to ours on the contingent character of bureaucratization's effects. Future research should explore the possibility of characterizing the generic features of enabling versus coercive types of bureaucratized employment relations.

Future research should also focus on the nature of hierarchy. On the one hand, much contemporary practitioner discussion focuses on the extent of vertical differentiation and the possibility of "delayering" to empower subordinates and accelerate decision making. On the other hand, Kohn and Schooler's (1983) study of a representative sample of men employed in civilian occupations found that the number of hierarchical levels in the organization was positively associated with levels of both substantive complexity of work and employees' ideational flexibility. The missing variable in these contrasting discourses is perhaps the enabling or coercive character of relations between layers. Middle managers can coerce compliance and intensify work or they can provide guidance, support, and coordination. Manzoni (1993), for example, contrasted the learning-oriented use of financial performance measures by superiors with their punitive use. Jelinek and Schoonhoven (1993) contrasted hierarchy based on dispersed expertise and shared control with the more traditional hierarchy based on positional authority and top-down control. Different organizations will define differently the function—as distinct from the extent—of hierarchy. The resulting differences in

the hierarchy design process, features, and implementation will have very different implications for employee relations, employee attitudes, and business outcomes.

The role of specialized staff groups—bureaucracy in the sense of staff versus line subunits—can also be usefully studied through this lens. In an era in which staffs are being eliminated and responsibilities pushed down into the line organization in the name of cost effectiveness and empowerment, it is useful to consider the possibility that staff experts do not have to play the coercive role that Mintzberg and others attribute to them. In some organizations, human resources and engineering staff units function as consultants or partners to the line organization (Mohrman and Lawler, 1993). Future research might seek to identify the features of a staff role that is experienced by the line organization as enabling.

A second strand of future research should focus on our typology itself. On the one hand, its theoretical foundations need buttressing. We have used the technology/bureaucracy and usability/enablement parallels to highlight some key distinguishing features, but in future research we need to develop appropriate theoretical explanations for why these features (repair, transparency, etc.) should lead to the associated outcomes. On the other hand, we need to develop empirical tests of the hypothesized antecedents and consequences of enabling and coercive designs.

A third possible line of further research would focus on individual differences. Our assumption in this article is that the objective characteristics of the organizational form will account for the central tendency in employees' attitudinal responses. But future research should seek to explain the variability in how these characteristics are perceived.

Finally, future research will need to explore whether and how organizations can shift from coercive to enabling types of bureaucracy. If coercive systems tend to ossify and resist transformation into enabling systems—through the accumulation of defensive routines, for example (Argyris, 1985)—then perhaps selection may be the more central mechanism of the diffusion process, as would be argued by population ecology theorists. Or perhaps performance differences between enabling and coercive types are swamped by their symbolic significance, and their respective diffusion rates may be shaped primarily by institutional and cultural factors. The competition between forms takes place not only within organizations but also in market competition and in the broader institutional context of law and culture.

The most critical objective for future research, however, is to get beyond the pejorative connotations that have swamped the term bureaucracy. Forty years ago, Gouldner (1955) denounced the "metaphysical pathos" that had surrounded the concept and stifled research on the possibility of forging forms of bureaucracy that could deliver efficiency without enslavement. It is time we took up his challenge.

REFERENCES

Adler, Paul S. (ed.)
1992 Technology and the Future of Work. New York: Oxford University Press.

Adler, Paul S.
1993 "The 'learning bureaucracy': New United Motors Manufacturing Incorporated." In Barry M. Staw and Larry L. Cummings (eds.), Research in Organizational Behavior, 15: 111–194. Greenwich, CT: JAI Press.

Adler, Paul S., and Robert E. Cole
1993 "Designed for learning: A tale of two auto plants." Sloan Management Review, 34(3): 85–94.

Adler, Paul S., and Terry A. Winograd (eds.)
1992 Usability: Turning Technologies into Tools. New York: Oxford University Press.

Alexander, Christopher
1964 Note on the Synthesis of Form. Cambridge, MA: Harvard University Press.

Applebaum, Eileen, and Rosemary Batt
1994 The New American Workplace: Transforming Work Systems in the United States. Ithaca, NY: ILR Press.

Arches, J.
1991 "Social structure, burnout, and job satisfaction." Social Work, 36(3): 202–206.

Argyris, Chris
1985 Strategy, Change, and Defensive Routines. Boston: Pitman.

Bailyn, Lotte
1985 "Autonomy in the R&D lab." Human Resource Management, 24(2): 129–146.

Bandura, A.
1977 "Self-efficacy: Toward a unifying theory of behavioral change." Psychology Review, 54: 191–215.

Barnard, Chester I.
1938 The Functions of the Executive. Cambridge, MA: Harvard University Press.

Beniger, James R.
1986 The Control Revolution. Cambridge, MA: Harvard University Press.

Bennis, Warren G.
1966 Changing Organizations. New York: McGraw-Hill.

Bennis, Warren G., and Philip E. Slater
1968 The Temporary Society. New York: Harper and Row.

Berggren, Christian
1992 Alternatives to Lean Production: Work Organization in the Swedish Auto Industry. Ithaca, NY: ILR Press.

Blau, Peter M.
1955 The Dynamics of Bureaucracy. Chicago: University of Chicago Press.

Bonjean, Charles M., and Michael D. Grimes
1970 "Bureaucracy and alienation: A dimensional approach." Social Forces, 48: 365–373.

Borys, Brian
1992 "Where do rules come from? Participant observation of the process of administrative innovation." Unpublished Ph.D. dissertation, Stanford University.

Bowen, David E., and Edward E. Lawler III
1992 "The empowerment of service workers: What, why, how and when." Sloan Management Review, 33(3): 31–40.

Braverman, Harry
1974 Labor and Monopoly Capital. New York: Monthly Review Books.

Brown, Clair (ed.)
1994 The Competitive Semiconductor Manufacturing Human Resources Project: First Interim Report. Berkeley, CA: Institute of Industrial Relations/Engineering Systems Research Center, U.C. Berkeley.

Brown, John Seely, and Paul Duguid
1992 "Enacting design for the workplace." In Paul S. Adler and Terry W. Winograd (eds.), Usability: Turning Technologies into Tools: 164–198. New York: Oxford University Press.

Burawoy, Michael
1985 The Politics of Production. London: Verso.

Burns, Tom, and George M. Stalker
1961 The Management of Innovation. London: Tavistock.

Clawson, Daniel
1980 Bureaucracy and the Labor Process. New York: Monthly Review Press.

Clegg, Chris W., and J. Martin Corbett
1987 "Research and development in 'humanizing' advanced manufacturing technology." In T. D. Wall, C. W. Clegg, and N. J. Kemp (eds.), The Human Side of Advanced Manufacturing Technology: 173–196. Chichester: Wiley.

Corbett, J. Martin
1992 "Work at the interface: Advanced manufacturing technology and job design." In Paul S. Adler and Terry A. Winograd (eds.), Usability: Turning Technologies into Tools: 133–163. New York: Oxford University Press.

Corbett, J. Martin, L. Rasmussen, and F. Rauner
1991 Crossing the Border: The Social and Engineering Design of Computer Integrated Manufacturing Systems. Springer-Verlag, London.

Cotton, John L., David A. Vollrath, Kirk L. Froggatt, Mark L. Lengnick-Hall, and Kenneth R. Jennings
1988 "Employee participation: Diverse forms and different outcomes." Academy of Management Review , 13: 8–22.

Cotton, John L., David A. Vollrath, Mark L. Lengnick-Hall, and Kirk L. Froggatt
1990 "Fact: The form of participation does matter—A rebuttal to Leana, Locke, and Schweiger." Academy of Management Review, 15: 147–153.

Craig, Tim
1995 "Achieving innovation through bureaucracy: Lessons from the Japanese brewing industry." California Management Review, 38(1): 8–36.

Crozier, Michel
1964 The Bureaucratic Phenomenon. Chicago: University of Chicago Press.

Cusumano, Michael A.
1991 Japan's Software Factories. New York: Oxford University Press.

Cyert, Richard M., and James G. March
1963 A Behavioral Theory of the Firm. Englewood Cliffs, NJ: Prentice-Hall.

Damanpour, Fariborz
1991 "Organizational innovation." Academy of Management Journal, 34: 555–591.

Deming, W. E.
1986 Out of the Crisis. Cambridge, MA: MIT Center for Advanced Engineering Study.

Dewar, Robert, and James Werbel
1979 "Universalistic and contingency predictions of employee satisfaction and conflict." Administrative Science Quarterly, 24: 426–446.

Dore, Ronald
1973 British Factory–Japanese Factory. The Origins of Diversity in Industrial Relations. Berkeley, CA: University of California Press.

Dumaine, Brian
1991 "The bureaucracy busters." Fortune, June 17: 36–50.

Duncan, Robert B.
1976 "The ambidextrous organization: Designing dual structures for innovation." In Ralph H. Killman, Louis R. Pondy, and Dennis Slevin (eds.), The Management of Organization, 1: 167–188. New York: North-Holland.

Edwards, Richard
1979 Contested Terrain. New York: Basic Books.

Engel, Gloria V.
1969 "The effect of bureaucracy on the professional autonomy of the physician." Journal of Health and Social Behavior, 10: 30–41.

Foucault, Michel
1977 Discipline and Punish: The Birth of the Prison. Harmondsworth: Penguin.

Gaines, Jeannie, and John M. Jermier
1983 "Emotional exhaustion in a high-stress organization." Academy of Management Journal, 26: 567–586.

Galbraith, Jay R.
1977 Organization Design. Reading, MA: Addison-Wesley.

Gerwin, Donald
1981 "Relationship between structure and technology." In Paul C. Nystrom and William H. Starbuck (eds.), Handbook of Organizational Design, 2: 3–38. London: Oxford University Press.

Gould, John D.
1988 "How to design usable systems." In M. Helander (ed.), Handbook of Human-Computer Interaction: 757–789. Amsterdam: North-Holland/Elsevier.

Goulder, Alvin W.
1954 Patterns of Industrial Bureaucracy. New York: Free Press.
1955 "Metaphysical pathos and the theory of bureaucracy." American Political Science Review, 49: 496–507.

Habermas, Jurgens
1984 The Theory of Communicative Action, vol. 1. T. McCarthy, trans. Boston: Beacon Press.

Hackman, J. Richard, and Greg R. Oldham
1980 Work Redesign. Reading, MA: Addison-Wesley.

Hall, Richard H.
1963 "The concept of bureaucracy: An empirical assessment." American Journal of Sociology, 69: 32–40.

Heckscher, Charles
1994 "Defining the post-bureaucratic type." In C. Heckscher and A. Donnellon (eds.), The Post-bureaucratic Organization: New Perspectives on Organizational Change: 14–62. Thousand Oaks, CA: Sage.

Heckscher, Charles, and Anne Donnellon (eds.)
1994 The Post-bureaucratic Organization: New Perspectives on Organizational Change. Thousand Oaks, CA: Sage.

Howard, Robert
1985 Brave New Workplace. New York: Viking.

Ives, Blake, and Margrethe H. Olson
1984 "User involvement and MIS research: A review of research." Management Science, 30: 586–603.

Jacoby, Sanford M.
1985 Employing Bureaucracy: Managers, Unions, and the Transformation of Work in American Industry, 1900–1945. New York: Columbia University Press.

Jackson, Susan E., and Randall S. Schuler
1985 "A meta-analysis and conceptual critique of research on role ambiguity and role conflict in work settings." Organizational Behavior and Human Decision Processes, 36: 17–78.

James, Lawrence R., and Allen P. Jones
1976 "Organizational structure." Organizational Behavior and Human Performance, 16: 74–113.

Jelinek, Mariann, and Claudia Bird Schoonhoven
1993 The Innovation Marathon. San Francisco: Jossey-Bass.

Kahn, Robert L., Donald M. Wolfe, Robert P. Quinn, J. Diedrick Snoek, and Robert A. Rosenthal
1964 Organizational Stress. New York: Wiley.

Kakabadse, Andrew
1986 "Organizational alienation and job climate." Small Group Behavior, 17: 458–471.

Kohn, Melvin L., and Carmi Schooler
1983 Work and Personality. Norwood, NJ: Ablex.

Kornhauser, William
1962 Scientists in Industry: Conflict and Accommodation. Berkeley: University of California Press.

Lawler, Edward E., III.
1992 The Ultimate Advantage: Creating the High-Involvement Organization. San Francisco: Jossey-Bass.
1994 "Total quality management and employee involvement: Are they compatible?" Academy of Management Executive, 8(1): 68–76.

Lawler, Edward E., III, Susan Albers Mohrman, and Gerald E. Ledford, Jr.
1995 Creating High Performance Organizations. San Francisco: Jossey-Bass.

Lawrence, Paul R., and Jay W. Lorsch
1967 Organization and Environment: Managing Differentiation and Integration. Boston: Harvard University Graduate School of Business Administration.

Leana, Carrie R., Edward A. Locke, and David M. Schweiger
1990 "Fact and fiction in analyzing research on participative decision making: A critique of Cotton, Vollrath, Froggatt, Lengnick-Hall, and Jennings." Academy of Management Review, 15: 137–146.

Lecht, Charles P.
1991 "Japan's software threat: A U.S.-made paper tiger." Computerworld, April 8: 25.

Leonard-Barton, Dorothy, and Deepak Sinha
1993 "Developer-user interaction and user satisfaction in internal technology transfer." Academy of Management Journal, 36: 1125–1139.

Levitt, Barbara and James G. March
1988 "Organizational learning." Annual Review of Sociology, 14: 319–340. Palo Alto, CA: Annual Reviews.

Lincoln, James R., and Arne L. Kalleberg
1991 Culture, Control and Commitment. Cambridge: Cambridge University Press.

Manzoni, Jean-Francois
1993 "Use of quantitative feedback by superiors: Causes and consequences." Unpublished DBA thesis, Harvard Business School.

Marsden, Peter V., Cynthia R. Cook, and David Knoke
1994 "Measuring organizational structures and environments." American Behavioral Scientist, 37: 891–910.

Maslach, C., and A. Pines
1978 "The burn-out syndrome in the day-care setting." Child Care Quarterly, 6: 100–113.

McDonough, Edward F., III, and Richard Leifer
1983 "Using simultaneous structures to cope with uncertainty." Academy of Management Journal, 26: 727–735.

McGregor, Douglas
1960 The Human Side of Enterprise. New York: McGraw-Hill.

Meyer, John W., and Brian Rowan
1977 "Institutionalized organizations: Formal structure as myth and ceremony." American Journal of Sociology, 83: 340–363.

Michaels, Ronald E., William L. Cron, Alan J. Dubinsky, and Erich A. Joachimsthaler
1988 "Influence of formalization on the organizational commitment and work alienation of salespeople and industrial buyers." Journal of Marketing Research, 25: 376–383.

Mintzberg, Henry
1979 The Structuring of Organizations. Englewood Cliffs, NJ: Prentice-Hall.

Mohrman, Allan M., Jr., and Edward E. Lawler III
1993 "Human resource management: Building a strategic partnership." In Jay R. Galbraith, Edward E. Lawler III, and Associates, Organizing for the Future: The New Logic for Managing Complex Organizations: 229–255. San Francisco: Jossey-Bass.

Morse, John J., and Jay W. Lorsch
1970 "Beyond Theory Y." Harvard Business Review, May–June: 61–68.

Nelson, Richard R., and Sidney G. Winter
1982 An Evolutionary Theory of Economic Change. Cambridge, MA: Belknap/ Harvard University Press.

Nicholson, Peter J., Jr., and Swee C. Goh
1983 "The relationship of organization structure and interpersonal attitudes to role conflict and ambiguity in different work environments." Academy of Management Journal, 26: 148–155.

Organ, Dennis W., and Charles N. Green
1981 "The effects of formalization on professional involvement: A compensatory process approach." Administrative Science Quarterly, 26: 237–252.

Parker, Mike
1985 Inside the Circle: A Union Guide to QWL. Detroit: Labor Notes/South End Press.

Parker, Mike, and Jane Slaughter
1988 Choosing Sides: Unions and the Team Concept. Boston: South End Press.

Parsons, Talcott
1947 "Introduction." In Max Weber, The Theory of Social and Economic Organization: 3–86. Glencoe, IL: Free Press.

Pennings, Johannes M.
1975 "The relevance of the structural-contingency model for organizational effectiveness." Administrative Science Quarterly, 20: 393–410.

Perrow, Charles
1983 "The organizational context of human factors engineering." Administrative Science Quarterly, 28: 521–541.
1986 Complex Organizations: A Critical Essay, 3rd ed. New York: Random House.

Pfeffer, Jeffrey
1981 Power in Organizations. Marshfield, MA: Pitman.

Pfeffer, Jeffrey, and Gerald R. Salancik
1978 The External Control of Organizations. New York: Harper & Row.

Pierce, John L., and Andre L. Delbecq
1977 "Organization structure, individual attributes, and innovation." Academy of Management Review, 2: 27–37.

Pines, A., and C. Maslach
1980 "Combating staff burn-out in a day care center: A case study." Child Care Quarterly, 9: 5–16.

Podsakoff, Philip M., Larry J. Williams, and William T. Todor
1986 "Effects of organizational formalization on alienation of professionals and nonprofessionals." Academy of Management Journal, 29: 820–831.

Pugh, D. S., and D. J. Hickson
1976 Organizational Structure and Its Context: The Aston Program. Lexington, MA: D.C. Heath.

Raelin, Joseph A.
1985 "The basis for the professional's resistance to managerial control." Human Resource Management, 24(2): 147–175.

Rheinfrank, John J., William R. Hartman, and Arnold Wasserman
1992 "Design for usability: Crafting a strategy for the design of a new generation of Xerox copiers." In P.S. Adler and T. W. Winograd (eds.), Usability: Turning Technologies into Tools: 15–40. New York: Oxford University Press.

Ritti, R. R.
1971 The Engineer in the Industrial Corporation. New York: Columbia University Press.

Rousseau, Denise M.
1978 "Characteristics of departments, positions and individuals: Contexts for attitudes and behavior." Administrative Science Quarterly, 23: 521–540.

Ryan, R. M., and J. P. Connell
1989 "Perceived locus of causality and internalization: Examining reasons for acting in two domains." Journal of Personality and Social Psychology, 57: 749–761.

Sahal, D.
1981 Patterns of Technological Innovation. Reading, MA: Addison-Wesley.

Salzman, Harold
1992 "Skill-based design: Productivity, learning and organizational effectiveness." In Paul S. Adler and Terry A. Winograd (eds.), Usability: Turning Technologies into Tools: 66–95. New York: Oxford University Press.

Schonberger, R. I.
1986 World Class Manufacturing. New York: Free Press.

Scott, W. Richard
1990 "Technology and structure: An organization-level perspective." In Paul S. Goodman, Lee S. Sproull, and Associates, Technology and Organizations: 109–143. San Francisco: Jossey-Bass.
1992 Organizations: Rational, Natural, and Open Systems, 3rd ed. Englewood Cliffs, NJ: Prentice-Hall.

Senatra, Phillip T.
1980 "Role conflict, role ambiguity, and organizational climate in a public accounting firm." Accounting Review, 55: 594–603.

Snizek, William E., and Jerri Hayes Bullard
1983 "Perception of bureaucracy and changing job satisfaction: A longitudinal analysis." Organizational Behavior and Human Performance, 32: 275–287.

Soat, John
1991 "Software factories." Information Week, July 22: 22, 28.

Stevens, Fred, Joseph Diedriks, and Hans Philipsen
1992 "Physician satisfaction, professional characteristics, and behavior formalization in hospitals." Social Science and Medicine, 35(3): 295–303.

Thompson, James D.
1967 Organizations in Action. New York: McGraw-Hill.

Thompson, Victor A.
1965 "Bureaucracy and innovation." Administrative Science Quarterly, 10: 1–20.

Walsh, J. P., and G. R. Ungson
1991 "Organizational memory." Academy of Management Review, 16: 57–91.

Walton, Richard E.
1985 "Toward a strategy of eliciting employee commitment based on policies of mutuality." In Richard E. Walton and Paul R. Lawrence (eds.), HRM Trends and Challenges: 119–218. Boston: Harvard Business School Press.

Waring, Stephen P.
1991 Taylorism Transformed: Scientific Management Theory since 1945. Chapel Hill, NC: University of North Carolina Press.

Weber, Max
1947 The Theory of Social and Economic Organization. Glencoe, IL: Free Press.
1978 Economy and Society. Berkeley, CA: University of California Press.

Wenger, Etienne
1988 "Glass box technology and integrated learning: Information, communication and knowledge in computerized environments." Unpublished thesis proposal, Dept. of Computer Science, University of California, Irvine.

Womack, James, Dan T. Jones, and Daniel Roos
1990 The Machine That Changed the World. New York: Rawson Associates/ Macmillan.

Zaltman, Gerald, Robert Duncan, and Jonny Holbek
1973 Innovations and Organizations. New York: Wiley.

Zuboff, Shoshana
1988 In the Age of the Smart Machine. Cambridge, MA: Harvard University Press.