# Charles Perrow and Business History: A Neo-Weberian Approach to Business Bureaucratization

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A currently popular phrase seemingly characterizes the attitude of a number of business historians to the suggestion that the field further investigate the process of business bureaucratization. Holding aloft their copies of Alfred Chandler's *Strategy and Structure, The Visible Hand,* and *Scale and Scope,* they assert, "Been there. Done that."

Although the field has gained significant insight from his approach to bureaucratization, it should view his scholarship as a starting point rather than as the definitive work on the subject. The Weberian model that underlies his analysis is only one of numerous theoretical frameworks historians can employ in examining the issue of business bureaucratization. By applying the neo-Weberian theories of Charles Perrow, scholars can generate a more comprehensive, complex, and robust depiction of the process than that offered by Chandler.

## Chandler and Those Who Have Accepted His Challenge

Historians recognize the contribution Chandler has made to the field's understanding of business bureaucratization. Prior to him, scholars produced detailed histories of such large bureaucratic entities as Standard Oil, which were based on no particular theory of organization [Hidy, 1955]. In sharp contrast to his predecessors, Chandler employs the structural-functional theories of Max Weber, Talcott Parsons, and Neil Smeltzer, and develops a synthetic view of bureaucratization, namely, managerial capitalism. In formulating his arguments, he emphasizes the emergence and development of managerial hierarchies and organization by functional area. In fact, he defines the modern enterprise as "one containing many distinct operating units which were managed by a hierarchy of salaried managers" [Chandler, 1977, p. 1]. Chandler also argues that companies developed bureaucratic structures exclusively for economic reasons. Bureaucratization maximized economic efficiency in the face of

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expanding markets, new technologies, and the need for greater sales and after-sales sophistication [Chandler, 1977, pp. 6-11, 178, 240-241, 258, 285, 370, 372]. According to his numerous examples, bureaucratization moved forward into even more complex forms such as the divisional structure [Chandler, 1977, pp. 456-463]. While Chandler acknowledges that middle managers standardized operating methods and procedures in the departments they oversaw, their roles in bureaucratization were far less important than those of the senior managers who made the strategic decisions. Yet despite this emphasis on upper management, he notes that managers throughout the organization readily became the products of universities, business institutes, and technical programs rather than the shop floor [Chandler, 1977, pp. 6-11, 272-282, 411-413, 464-468].

While these arguments found wide acceptance among business historians, Chandler wanted his peers to view them as a foundation to build upon, and some historians have accepted this challenge. For example, in *Control Through Communications*, JoAnne Yates moves away from his focus on hierarchies, functional departments, and strategic decisions to examine day-to-day communications in three divergent large firms, the Illinois Central Railroad, Scovill Brass, and DuPont. By delving into operational detail, Yates identifies a key determinate of bureaucratization that is notably absent from *The Visible Hand* and only sporadically mentioned in *Strategy and Structure* – the attitude of individual managers [Chandler, 1962, pp. 163, 165]. Company leaders and key department heads had to "view formal communications as the means by which they could efficiently coordinate, monitor, and evaluate the performance of their subordinates" [Yates, 1989, p. 273].

The cultural historian Olivier Zunz also views individuals as a key to bureaucratization. In *Making America Corporate,* he argues that to understand the process, one has to examine the bureaucratizers' backgrounds, values, and visions of business organization rather than just the structures they create. Upper management alone did not create bureaucratic structures and practices. Middle and lower echelon managers helped develop and shape them by devising departmental rules and procedures and formulating hiring standards and performance criteria for their subordinates [Zunz, 1990, pp. 6-10, 49-54, 65].[2] Through a comparison of the supervisors and white-collar employees within the sales and service departments of International Harvester and DuPont, the production area of Ford Motor Company, the claims and clerical support departments of the Metropolitan Life Insurance Company, and the various functions within the Chicago, Burlington, and Quincy Railroad, he demonstrates that not all managers were products of advanced education. Due to differences in the nature of their work and the personalities of their leadership, companies hired managers of varying familial and educational backgrounds [Zunz, 1990, pp. 12, 69, 75, 79-101, 127-128, 137]. Yet despite these differences, middle and lower echelon managers had common values that

[2] While Zunz makes such claims, he does not provide specific examples to substantiate his assertions. He does, however, provide significant documentation regarding the varying types of individuals who filled managerial positions.

facilitated bureaucratization. They believed in order and formal work rules and structures. They sought to maximize efficiency and believed that individuals could achieve personal success and find sufficient outlets for personal expression within the confines of the bureaucratic company [Zunz, 1990, pp. 39, 63].

While Yates and Zunz expand Chandler's depiction of bureaucratization, Philip Scranton challenges the generalizability of his conclusions. Scranton examines the structure of large firms that do not fit the Chandlerian paradigm, namely the large custom-batch producers. He notes that "unlike their throughput counterparts, batch firms could never sustain the illusion that they could control their market environment, manage technological change, and use formal rationality to make decisions." Yet, one cannot "presume these were failed efforts at achieving bulk or mass production." Such firms represented an alternative successful form of organization to that emphasized by Chandler. Scranton further argues that by examining such firms, one gains new ways of examining their more bureaucratically structured counterparts [Scranton, 1991, pp. 89-90].

Although Yates, Scranton, and Zunz each offer a unique perspective on business bureaucratization, one can draw two inter-related conclusions from their divergent arguments. Chandler's synthetic depiction of bureaucratization is too generalized and simplified, and there are approaches to the issue that yield more comprehensive views of the process. In fact, one need not go theoretically far afield from Chandler's Weberian framework. The neo-Weberian theories of organizational sociologist, Charles Perrow, not only generate a more complex and robust depiction of business bureaucratization than that offered by Chandler, but they expand many of the arguments raised by his challengers.

## Charles Perrow's Neo-Weberian Approach to Bureaucratization

If one has heard of Charles Perrow, it is usually in connection with the book *Complex Organizations*. While this monograph provides an excellent overview of various schools of organizational thought, it deals only marginally with Perrow's own theories. The scholarship that focuses solely on his conception of organization, however, is far less known and well received for a number of reasons. Perrow is an organizational sociologist working in a field dominated by management theorists and economists whose scholarship revolves around human relations and econometric models – approaches Perrow largely rejects.[3]

[3] The human relations school focuses on the issue of how leadership and group relations affect productivity and organizational climate. Scholars within this school include Fred Fiedler, Rensis Likert, Arnold Tannenbaum, James March, and Herbert Simon. Econometric models of organization are based primarily on two theories: principal-agent and transaction costs. Notable scholars include Armen Alchian, and Harold Demsetz in the area of principal-agent theory, and Oliver Williamson and William Ouchi in transaction costs.

> It [the human relations school] lacks empirical support and conceptual clarity, and it fails to grapple with the realities of authoritarian control in organizations and the true status of the subordinate [Perrow, 1986, p. 119].
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> As with all theories, we can learn something from agency theory and transaction-costs economics, since they emphasize something others hide. But as with all theories, they also distort; in fact, I will argue that their distortions outweigh the value of what they highlight [Perrow, 1986, p. 220].

The work of the management theorists and economists generally encompasses readily testable hypotheses, and their conclusions are often prescriptive in that they postulate ideal forms of organization. Perrow's models are complex and descriptive; there are no ideal forms [Perrow, 1986, p. 85].

Further eroding his position within the field is the total reversal he has made in his theoretical approach. He began his academic career in 1960 as a neo-Weberian and early developer of contingency theory.[4] During the early 1970s, he became increasingly dissatisfied with his framework because it did not adequately deal with how the power of individuals and groups inside and outside an organization affected its structure and how the power of an organization affected its environment [Perrow, *Departmental Power,* 1970, pp. 67-68, 72,74, 82-83, 85; 1974, p. 41]. By 1977, he totally rejected his neo-Weberian stance and began developing an organizational model centered almost solely on the issue of power [Perrow, *Three Types,* 1977, pp. 97, 101; 1978, pp. 106, 112, 118; 1981, p. 382; 1986, pp. 11-12, 77, 176-177, 259-272; Perrow and Guillen, 1990, pp. 107, 131].

> I once believed that if organizations had a better fit between their technology and their structure, they would be more efficient and thus more profitable [Perrow, *Three Types,* 1977, p. 97].
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> It [a power based model of organization] sees organizations as intentional human constructions but not necessarily rational systems guided by official goals; as bargaining areas rather than cooperative systems; as systems of power rather than coercive institutions reflecting cultural norms, and as resources for other organizations and groups rather than closed systems. If we define organizations, then, as intentional human constructions wherein people and groups within and without the organization compete for outputs of interest to them under conditions of unequal power, we have posed the issue of effectiveness quite differently [Perrow, *Three Types,* 1977, p.101].

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[4] Contingency theory constitutes a primary branch of the neo-Weberian school and the two terms are sometimes mistakenly used interchangeably. Contingency theory argues that certain factors, most notably technology, determine organizational structure. Besides Perrow, other scholars of contingency theory are Joan Woodward, Paul Lawrence, Jay Lorsch, and James Thompson.

Perrow's rejection of his original framework and his lack of wide scholarly recognition do not, however, negate the value of his neo-Weberian model. It remains a useful analytic tool for exploring business bureaucratization because it deals with two key inter-related facets of organization: goals, and routine and non-routine tasks. Moreover, Perrow's arguments regarding these aspects encompass two other important dimensions of organization, namely conflict and resistance.

**Goals:** "Since organizations are established to do something, to perform work directed to some end, all organizations have goals – some implied, some explicit" [Perrow, *Organizational Analysis,* 1970, p. 133]. Organizational goals can be classified into six categories. Three of these deal with the interaction of a firm with its environment. There are societal goals, which are the values, objectives, and constraints placed on the organization by the society and the culture in which it operates. Individuals within the firm, often in conjunction with outside constituencies, determine its output goals. Unlike Chandler, Perrow views these goals as extending beyond the company's obvious products and services. A firm can decide to serve as a training ground for the area's unemployed; thus, training and education become part of its outputs. A company engaged in lobbying has legislation as an output. Firms also have investor goals, which include both short and long-term objectives [Perrow, 1961, p. 854; *Organizational Goals,* 1968, pp. 305-307, 309; *Organizational Analysis,* 1970, pp. 133, 142-145, 147, 152-153; 1972, pp. 60, 72].

The remaining three goal categories deal with an organization's internal operations. Unlike Chandler, Perrow argues that system goals go beyond maximizing efficiency and deal with such considerations as the level of acceptable risk, the degree of desired stability, and the preferred rate of growth. While mid- and low-level managers have some influence on system goals, senior officials remain the primary formulators. Such is not true, however, for product goals. Lower management levels have significant input into such specific aspects of a firm's product and services as variety and availability. Companies also have derived goals, and these emerge out of the organizations' daily operations. For example, deciding to use an environmentally hazardous material in manufacturing can lead a firm to revise its product and output goals [Perrow, *Organizational Goals,* 1968, p. 307-308; *Organizational Analysis,* 1970, pp. 154-159].

Identifying a company's goals is critical to understanding bureaucratization because goals affect organizational structure. Environmental protection laws force firms to develop elaborate formal procedures for dealing with smokestack emissions and hazardous wastes. In companies where families are the majority owners, the leadership frequently develops organizational structures that assure the employment of younger and future generations and provide family members with adequate time and financial resources to pursue charitable and political activities. Having basic research as an output goal suggests establishing less formal structures in such areas as R&D, while a product goal such as ease of replication facilitates the establishment of bureaucratic structures in production [Perrow, *Organizational Goals,* 1968, pp. 308-309;

*Organizational Analysis,* 1970, pp. 134, 137; 1986, pp. 123-124, 127-128; 1986, pp. 63-64, 146].

The pursuit of multiple goals also forces firms to develop organizational mechanisms to deal with conflict – another consideration notably absent from Chandler's model.[5] Since companies pursue multiple goals that often do not complement one another, the potential for conflict is always present [Perrow, 1961, p. 855; *Organizational Goals,* 1968, p. 309; *Organizational Analysis,* 1970, pp. 136, 161, 173-174; 1978, p. 133]. A company may have a system goal that emphasizes high sales and a product goal stating that quality assurance takes precedence over the volume of production. Conflict will arise when sales learns that there is inadequate inventory of a product because production has shut down the line for an indefinite period to rectify quality problems. In one firm, such a dispute may be resolved by calling an informal meeting between the parties involved, in another, there may an executive committee whose duties include resolving inter-departmental conflict.

**Routine and non-routine tasks:**[6] Perrow's arguments regarding tasks grow out of his observation that:

> Organizations are systems for getting work done, for applying techniques to the problem of altering materials... In the process of changing materials, individuals must interact with one another; the forms such interaction take is called organizational structure... Structure is the interrelationship, the arrangements that permit control and coordination of work [Perrow, *A Framework,* 1967, p.195; *Technology and Organizational Structure,* 1967, p. 156].

According to Perrow, the techniques and processes individuals utilize in performing their work fall into two categories, routine and non-routine, and each of these is associated with a distinct form of organization [Perrow, *Organizational Analysis,* 1970, p. 91; 1986, p. 14].

Routine tasks are those that are well understood, predictable, and repetitive. Because they bear these characteristics, one can direct and limit the behaviors of those performing them by breaking them down into specialized

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[5] Here too, Perrow is one of a number of organizational theorists dealing with the issue of conflict. Such human relations school members as Likert also view conflict as an inherent element of organization [Rensis Likert, *New Ways of Managing Conflict,* New York, 1975]. Yet Likert argues that conflict is always destructive; therefore organizations must make every attempt to limit and even eradicate it. Other human relations school theorists, such as Cyert and March and such neo-Weberian theorists as Dalton also depict conflict as embedded in every organization, but they claim that under the correct structure, conflict can enhance outcomes [Richard M. Cyert and James G. March, *A Behavioral Theory of the Firm,* Englewood Cliffs, 1963; Melville Dalton, *Men Who Manage,* New York, 1959]. The notion of conflict as a natural outcome of company goals is also central to the work of Marxist theorists. They assert that conflict between managers and production employees is inevitable until workers once again wrest control of production from capitalist owners and managers.

[6] This portion of Perrow's neo-Weberian framework encompasses the arguments which have caused scholars to classify Perrow as a contingency theorist. See footnote five for further discussion of contingency theory and the other proponents of this school.

activities and by devising formal rules and procedures. Thus, bureaucratic structures represent the most efficient means of organizing routine tasks [Perrow, *Effect of Technological Change,* 1968, pp. 208-209; 1986, p. 142]. Yet as a result of erecting such bureaucratic structures, the individuals performing routine tasks lose varying amounts of control over how they will carry them out and how they will mobilize and utilize available resources [Perrow, *A Framework,* 1967, pp. 198-199; *Technology,* 1967, pp. 157-159].[7]

In contrast, non-routine tasks are those in which the situation is unique, ever-changing, or poorly understood [Perrow, *Organizational Analysis,* 1970, pp. 60-61, 76-77; 1986, p. 142 ]. Here, bureaucratic structures are of limited use, and opportunities for centralizing control remain limited. Due to the tasks' uniqueness and variability, one can only formulate informal rules and procedures and reinforce appropriate behaviors that workers may exhibit as a result of their training and previous experience.[8] Behavior reinforcement, however requires direct observation or reviewing performance reports. It is only in the means that one establishes for such reporting as well as for reinforcing behavior and selecting individuals who appear to have applicable training and experience that one can bureaucratize non-routine tasks [Perrow, *Technology,* 1967, pp. 157-159; *Effect of Technology,* 1968, pp. 209, 215; *Organizational Analysis,* 1970, p. 62; 1974, pp. 36, 40; 1986, pp. 129-130, 198-199].

Perrow notes that:

> Most social scientists consider the non-bureaucratic, non-routine organization to be good and the bureaucratic or routine organization to be bad (it impedes progress, is old-fashioned, is hard on its employees, etc.), but this judgment is debatable [Perrow, *Organizational Analysis,* 1970, p. 66].

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[7] In making the observation that bureaucratization equates to a loss of control, Perrow, to a degree, echoes the arguments of such human relations theorists as Likert [Rensis Likert, *New Patterns of Management,* New York, 1961; *The Human Organization,* New York, 1967]. Marxist theorists and such new labor historians as Harry Braverman, Dan Clawson, David Montgomery, Daniel Nelson and David Noble also discuss bureaucratization in terms of a loss of control. Yet they put it in a negative context by depicting bureaucratization as capitalists intentionally wresting control of the workplace from the workers [Harry Braverman, *Labor and Monopoly Capital,* New York, 1974; Dan Clawson, *Bureaucracy and the Labor Process,* New York, 1980; David Montgomery, *The Fall of the House of Labor,* Cambridge, 1987; Daniel Nelson, *Managers and Workers,* Madison, 1975; David F. Noble, *America By Design,* New York, 1977].

[8] Perrow bases this latter argument regarding behavior reinforcement on the concept of limited rationality – a notion also central to the theories of such scholars as Ouchi, Simon, and Williamson [William G. Ouchi, "Markets, Bureaucracies and Clans," *Administrative Science Quarterly* 25 (1980) 129-141; Herbert A Simon, *Administrative Behavior,* 3rd edn., New York, 1976; Oliver Williamson, "Organizational Innovation: The Transaction-Cost Approach," in J. Ronen, ed., *Entrepreneurship,* Lexington, 1983]. For an interesting view on Perrow's argument that workers have informal rules and procedures embedded within them see Michael Polanyi, *The Tacit Dimension* (London, 1967).

In fact for him both structural forms have merit because each represents the most efficient and effective way to organize a different type of task [Perrow, *Effect of Technology,* 1968, p. 216]. Yet, he also acknowledges that individuals will attempt to routinize all the tasks over which they have authority because routinization enhances predictability and centralizes control. Operational efficiency drops and employee dissatisfaction rises, however, when supervisors erroneously impose bureaucratic structures on departments and areas in which non-routine tasks predominate [Perrow, *Effect of Technology,* 1968, pp. 213, 218; *Organizational Analysis,* 1970, pp. 66-67; 1986, pp. 36-42].

Since companies and even departments can encompass both routine and non-routine tasks, Perrow does not employ the simple dichotomy of the bureaucratic and the unbureaucratic firm. Rather, he views organizations as falling somewhere on a spectrum that ranges from fully routine to fully non-routine. Their position on the spectrum depends on the nature of all the tasks that comprise their operations [Perrow, *Effect of Technological Change,* 1968, p. 210; *Organizational Analysis,* 1970, pp. 71, 75; 1986, p. 145].

What determines the tasks a company performs? Its goals. Some goals can be accomplished by solely initiating routine tasks, others only non-routine tasks, and still others, a combination of both [Perrow, 1986, pp. 145-146]. Moreover, just as goals can change, tasks can switch from routine to non-routine and visa-versa. Therefore unlike Chandler's model in which companies only move forward in terms of bureaucratization, Perrow's firms can move in both directions [Perrow, *Effect of Technological Change,* 1968, p. 210; *Organizational Analysis,* 1970, p. 73]. The switch from routine to non-routine occurs less frequently, however, because of the sunk costs, centralization of control, and ease of coordination that are associated with bureaucratic structures [Perrow, *Organizational Analysis,* 1970, pp. 58, 65; *Effect of Technological Change,* 1968, pp. 212, 217].

Not only are individuals reticent to go from routine to non-routine tasks, they are often resistant to change of any kind. Due to their limited rationality, they tend to favor the approach they are currently using. Moreover, many view their approach as the best and want to impose it on others, who in turn want to impose their method on them. The outcome of such attempts is conflict [Perrow, *Organizational Analysis,* 1970, p. 57; 1986, pp. 132, 230].

Perrow's arguments regarding tasks raise some important issues in regard to business bureaucratization. If firms are frequently a mixture of routine and non-routine tasks, are such firms as DuPont, which Chandler and others hold up as the epitomes of bureaucratization, truly bureaucratic monoliths? For example, what about R&D at DuPont? According to Hounshell and Smith's detailed account, attempts at full bureaucratization failed because conducting basic research remained a non-routine function [Hounshell and Smith, 1988]. What of Scranton's custom-batch producers [Scranton, 1991]? Based on Perrow's suggested methods for controlling the individuals performing non-routine tasks, it may be that while actual production remained informally organized, such ancillary activities as performance reporting and employment policies became bureaucratized. Have small

and mid-sized businesses really escaped bureaucratization? By early in the twentieth century, a number of such firms began using standardized forms for accounting, ordering, shipping, and employment. Does this not imply that in some ways even these firms become partially bureaucratized?

Yet in placing all firms somewhere on Perrow's bureaucratization continuum, one has to deal with another dimension, namely time. As Perrow notes, a change in the nature of a task often requires a modification in organizational structure. Thus a firm or even an entire industrial sector that was largely unbureaucratic in 1880, may have been fully bureaucratic in 1950. Although such historians as Yates, Jacoby, and Johnson and Kaplan have begun to explore systematically some of the types of activities undergoing bureaucratization and the internal and external factors that affected the nature and rate of their transformation, their research has focused largely on production and transportation companies [Yates, 1989, Jacoby, 1985; Johnson and Kaplan, 1987].[9] Moreover, since bureaucratization is largely viewed as a movement that emerged in the late nineteenth century, these scholars have also concentrated on examining company activities post-1880. Yet, were not the Lowell mill owners, the New England shoe manufacturers, and the New York City furniture and construction companies beginning to routinize their operations as early as 1830? According to such labor historians as Blewett, Dublin, and Wilentz, these firms centralized control, subdivided tasks into specialized activities, posted rules governing worker behavior, and utilized simple but standardized accounting ledgers prior to the Civil War [Blewett, 1988; Dublin, 1979; Wilentz 1984]. Are these not the seeds, the roots of modern bureaucratization? Thus scholars not only need to build upon the research of such scholars as Jacoby, Yates, and Johnson and Kaplan in terms of activities and industrial sectors which underwent bureaucratization, but also to extend the span of time in which the process occurred.

Perrow's arguments regarding conflict and resistance also merit further research. While labor historians have examined how firms use structure and other mechanisms to deal with the issue of conflict and resistance between production employees and their supervisors, little work has been done regarding managerial conflict and resistance.

Moreover, Perrow's assertion that firms attempt to routinize all tasks, at times in error, raises another issue often ignored by business historians – failure. What does inappropriate structure have to do with a company's inability to achieve certain goals, even to survive? While it is difficult to find the records of failed companies, a large percentage of firms have experienced some sort of failure in goal achievement. Identifying such occurrences allows one to explore more fully the connection between these two important considerations.

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[9] As noted in the previous discussion, Yates examines the emergence of formal communication mechanisms in manufacturing and transportation companies. On the other hand, Jacoby deals with the rise of formal employment structures in manufacturing firms, and Johnson and Kaplan focus on accounting procedures in manufacturing firms.

## Applying Charles Perrow's Neo-Weberian Approach – The Case of Sun Oil Refineries

While these observations clearly suggest that Perrow's theoretical framework can provide a more complex and robust view of business bureaucratization, applying his approach to an actual case, namely the refining operations of the Sun Oil Company, more ably demonstrates the power of his model.[10]

In dealing with the bureaucratization of such continuous process industries as oil refining, Chandler uses Standard Oil of New Jersey as his primary example. Sun Oil receives little attention. Chandler notes that Sun emerged and grew because of the discovery of the Ohio and Texas oil fields, and that it underwent vertical integration, and adopted new technologies in order to remain competitive. He says little else because "at Sun, Phillips, Sinclair, Gulf, and possibly one or two others, the founders did continue to participate as full time managers in top level decision-making positions" [Chandler, 1962, pp. 97, 102, 104; 1977, p. 350].

By utilizing Perrow's approach, however, a significantly different and more complex and complete view of the firm emerges. Slowly and often reluctantly, Sun's refinery operations became increasingly bureaucratized.[11] Yet as the employment, refining, and accident prevention activities of its Marcus Hook, Pennsylvania and Toledo, Ohio facilities between 1895 and 1929 reveal, the causes and rates of bureaucratization and the people who initiated and formulated the new bureaucratic structures varied from area to area. Moreover, managerial conflict and resistance at all levels accompanied the transformation.

**Employment:** Until 1928, Sun's approaches to hiring, firing, promoting, and transferring refinery employees remained largely informal and in the hands of plant foremen and superintendents. The establishment of formal rules regarding such matters, occurred sporadically and only in response to persistent problems. In 1909, O.C. Pudan, the supervisor of Marcus Hook, persuaded company president, J.N. Pew, to adopt a formal company-wide rule calling for the immediate termination of anyone who brought liquor onto company premises or appeared intoxicated. Pudan, a long-time employee who had previously supervised production for Sun's gas subsidiary, kept catching his employees drinking or intoxicated while on the job, and he felt that the formal establishment of such a rule would help limit this behavior. To end an on-going dispute between two department heads in 1910, J.N. Pew instructed J. Howard, his son and then head of the Marcus Hook refinery, to prepare formal job descriptions for the positions in question. By 1926, the firm had a formal rule that barred the re-employment of any employee who had quit unless there was

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[10] The following discussion is drawn from the author's forthcoming dissertation, a comparative study of the operational practices of the High Explosives Operating Department of DuPont and its predecessor organizations, 1880-1920 and the refinery operations of Sun Oil, 1890-1939.

[11] According to Dicke, Sun's sales operations underwent a similar process during the late 1920s and early 30s as a result of the company's entry into the retail market for gasoline and other automotive products [Dicke, 1992].

no one else capable of filling the position. The practice of rehiring disgruntled employees had caused too much dissatisfaction among the workers who had remained loyal to the company. In 1927, A.E. Pew, Jr., Annapolis and MIT engineering graduate, supporter of more formal organizational structures, and nephew to then president, J. Howard Pew, persuaded his uncle to have all salaried refinery employees within the research, engineering, and production areas sign non-disclosure agreements as a condition of their employment. At the time, the company had just developed methods for producing no-knock gasoline and high performance motor oils, and A.E. Jr. feared that without such a formal mechanism, competitors could easily learn the details of these innovative processes.[12]

Beginning in 1928, however, the firm began to adopt much more formal employment procedures, largely at the initiation of William D. Mason, the general manager of Marcus Hook. Mason was a practically rather than university trained refiner who had worked in product and process development for Standard Oil of California until his employment by Sun in 1926. Mason quickly saw a need for the refinery to adopt some of the formal employment practices he had worked under at Standard. Due largely to the expansion of its gasoline and motor oil operations after 1919, refinery employment had climbed to 975 in 1928. The facility was experiencing high turnover and job transfers were handled so unsystematically that departments lost people without proper notification. Since most decisions had to have the approval of the company president, he wrote J. Howard Pew in an attempt to convince him of the need for more formal employment procedures. In September 1928, J. Howard reluctantly agreed to allow him to establish a personnel department at Marcus Hook. While the department could develop formal mechanisms for dealing with employment matters, Mason was to keep the system as small and simple as possible.[13]

J. Howard's reticence was not surprising. Despite studying chemistry and engineering at Grove City College and MIT, he remained extremely skeptical of bureaucratization. Like his father J. N., he equated it with companies like Standard Oil, which he viewed as a monopoly that had attempted to destroy the nation's bedrock – free enterprise.[14] As he stated in a speech nearly a decade later, "The truth is that success in any business depends a good deal more on men and management than on the formalities of organization." J. Howard was not the only senior executive to hold this opinion; his brother and company vice-president, J.N. Jr., felt the same way despite his

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[12] Giebelhaus, 1980, p. 76; O.C. Pudan to J.N. Pew, Mar 22, 1909, J.N. Pew to J.H. Pew, September 29, 1910, Box 14, Series 1C; F.E. Bresser to A.E. Pew Jr, April 22, 1927, Box 58, Series 4; C.R. Innes to Mrs. G.H. Laughead, Nov. 6, 1926, Box 86, Series 1D, Inventory #1, Accession 1317, Hagley Museum and Library, Wilmington, Delaware. Unless otherwise noted, all further references are found in Inventory #1, Accession 1317, Hagley.

[13] W.D. Mason to J.H. Pew, Sept. 28, 1928, J.H. Pew to W.D. Mason, Oct. 3, 1928, Box 132, Series 1F.

[14] For a more-thorough going discussion of the Pew family's views of monopoly and competition and how such affected their reaction to regulation, see Giebelhaus [1980].

training as an engineer at Cornell. Responding in 1928 to A.E. Pew Jr.'s suggestion of creating a new department within sales, he argued that since Sun was a small business, it was unnecessary to departmentalize everything. Informal interactions between employees were more desirable. At the time of the memo, J.N. Jr.'s so-called small company employed over 2,000 people, participated in all phases of the petroleum business, and had 21 departments at its Philadelphia headquarters, and 17 at Marcus Hook.[15]

While the former head of Sun's cooperage operations, Robert Graham, set about the task of formalizing employment procedures at Marcus Hook, neither the Toledo refinery nor even company headquarters apparently followed suit, largely because of J. Howard's and J.N. Jr.'s wariness. The 1933 passage of the National Recovery Act's Petroleum Code finally forced Sun to establish personnel departments at its other primary locations. Even then, J.N. Jr. indicated that he thought that these were temporary measures. He was wrong, however. By the end of the year, all Sun operations used standard application forms, and by 1937, both the Toledo and Marcus Hook refineries had formal job descriptions for all their salaried positions and issued formal annual salary plans.[16]

**Refining:** Until the early 1920s, Sun's refining process remained informal. Yet once the plants began to focus on producing gasoline in 1919, this quickly changed. When Sun acquired its Toledo refinery in 1895 and opened its Marcus Hook facility in 1902, it could produce its products fairly simply. Its major output, gas oil, which it refined for its key customer and partner, the United Gas Improvement Company of Philadelphia, essentially entailed "cooking" crude oil in large vats and then capturing and distilling the gas oil vapors in pipes above the vat. In fact, the process was simple enough that a practically trained refiner with a lesser-experienced workcrew could handle the process without much instruction at all. Even if Sun had desired to develop formal operating instructions, such would have been difficult because crudes from different fields and even levels within the same field contained divergent amounts of gas oil and "gave it up" at varying rates.[17]

Since gas-oil production left a large crude residuum, Robert Pew, who oversaw all refining and production activities in Ohio, convinced his uncle, J.N. Pew, that the refinery should hire a university trained chemist to develop a process for producing lubricating oils from the crude remains. Moreover, since Robert had fired the plant superintendent for drinking, this individual would also oversee all refinery operations. In 1896, Robert hired the chemist, F.E. Knoch, and by 1898, Knoch had a lubricating oil refining process in commercial operation. Buoyed by the initial sales success of the oils, J.N. was

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[15] J.H. Pew to W.D. Mason, Oct. 3, 1928, Box 132; J.N. Pew Jr. to A.E. Pew Jr., June 12, 1928, Box 133, Series 1F; speech excerpt quoted in Johnson, 1983, pp. 20-21.

[16] J.N. Pew to Philadelphia office department heads, Aug. 2, 1933, Box 150, Series 1F; Salary budget sheets, Box 1, Series 5.

[17] Hidy, 1955, pp. 42, 432; Williamson, Andreano, Daum, and Klose, 1963, pp. 112-113, 124-125; R. Pew to J.N. Pew, July 6, 1895, Box 19, Feb. 2, 1896; J.E. Pew to J.N. Pew, Nov. 18, 1897, Box 55, Feb. 1, April 28, 1899, Box 56, Series 14.

eager to develop even higher grades of the product. Yet, he could not turn to Knoch for assistance; Robert had fired him in 1900 because he lacked practical refining experience. Therefore, J.N. turned to his son, J. Howard in 1902, and instructed him to establish a rudimentary laboratory at Marcus Hook for the purpose of developing the higher grade oils. By 1904, J. Howard had not only created the vacuum process but also a way for refining a high quality tar that the company sold under the name of Hydrolene. Although both Knoch's and J. Howard's lubricating oil processes involved the use of chemical additives and Hydrolene refining required passing the distillate through high pressure steam, the procedures were still simple and similar enough to those used by other refiners that experienced stillmen and treaters could quickly learn them through verbal instruction and demonstration.[18]

Despite the informality of its refining methods, Sun rapidly established a number of bureaucratic practices to monitor performance and product consistency and quality. Robert and O.C. Pudan, the first supervisor of Marcus Hook, replicated the organizational arrangement employed by other refiners. They divided their plants into functional areas and put experienced personnel at the head of each of these departments. J.N. Pew ordered Knoch, and after his dismissal, J. Howard and an ever-changing group of university-trained chemists temporarily employed by the company, to use a standardized set of tests to determine the composition of the various crudes the refineries received and to report their findings, in writing, to both him and the refinery heads. The analysis provided the plants with some guidance as to how to process the crudes as well as some indication of the type of yields they might expect during refining. He further instructed Knoch, J. Howard, and the "contract" chemists to develop, in consultation with him and others involved in product sales, written specifications for each product the company sold. Moreover, they were to conduct a standard set of tests on samples from each production run to assure that they met specification. In 1895, J.N. directed the Toledo refinery to begin keeping daily records of the types and amounts of crude it received and the yields of various products each type of crude generated. The refinery was also to report these figures weekly, in writing, to him at company headquarters in Pennsylvania. In 1899, he ordered the refinery to record and report the amount of crude lost during refining and storage as well.[19]

Although the refineries more than tripled in size by 1911, installed continuous process stills in 1912, and expanded their outputs to include greases, paraffin, and a wide range of high performance industrial lubricating oils by 1918, none of these actions required them to bureaucratize their processing methods. In 1918, however, this began to change. The refineries

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[18] Giebelhaus, 1980, p. 46; F.E. Knoch to J.N. Pew, Oct. 25, 1897, Jan. 18, Aug. 29, Sept. 12, 1898, Box 50; J.N. Pew to J.H. Pew, Mar. 11, 1902, Box 26, Series 14.

[19] Report of Crude Runs to Refinery Through Stills-Products-Percent Of-From Feb. to Dec. 1895, Box 20; Weekly Production Report, Sept. 12, 1895, Box 19; J.E. Pew to J.N. Pew, April 19, 1897, Box 55, July 14, 1899, Box 57; F.E. Knoch to J.N. Pew, Oct. 11, Dec. 13, 1897, Feb. 11, June 13, 1898, Box 50, Series 14; J.N. Pew to J.H. Pew, Mar. 26, Aug. 27, 1909, Box 14, Series 1C

now confronted huge excess capacity problems because Sun had ended its relationship with its long-time customer and partner, the United Gas Improvement Company. Due to the rapidly growing popularity of the automobile, gasoline had become the most demanded product. Yet since Sun had sold gasoline merely as a by-product of producing gas oil, its gasoline production capabilities lagged behind those of the other major refiners. Many of them were developing or licensing thermal cracking processes, which significantly increased their gasoline yields because thermal cracking used a combination of high heat and pressure to break down the complex hydrocarbons within crude further than was possible with the addition of only heat. While Sun was well aware of the technology, J. Howard refused to license or develop a thermal cracking process because such would entail a loss of control. Licensing meant that someone else would determine how Sun refined its products. The capital required to develop the process outstripped the company's reserves. The family would have to sell a small but still significant interest in the firm to outsiders. Due to J. Howard's stubbornness, the refineries attempted to produce gasoline using existing equipment and processes. Yet no matter how much refinery personnel modified these, gasoline yields remained unfavorably low. The heat only approach did not work on the high asphalt-based crudes they were utilizing. In 1922, J. Howard reluctantly agreed for the company to license the Cross thermal cracking process, and by 1923, Sun had six Cross units in operation at Marcus Hook.

The bureaucratization of Marcus Hook's refining processes accompanied the installation of the Cross units. Thermal cracking required precision. Each step within the process entailed its own run time, pressure, and temperature. Moreover, these changed depending on the type of crude or intermediate product that one put into the system and the characteristics one desired from the outputs. Since each unit operated at an average 885 degrees Fahrenheit and 650 pounds of pressure per square inch, its various components, particularly its pipes, were highly susceptible to damage. To assure operating safety and maximum performance, each unit had to undergo inspection, maintenance, and pipe replacement on a regularly scheduled basis. Even the additional experienced refinery workers Marcus Hook hired away from area competitors who used thermal cracking could not effectively deal with the complexity of operating and maintaining the Cross units without formal instructions. Therefore, the refinery implemented training programs and issued operating and maintenance manuals to those working with the units.[20]

These training programs and manuals, however, soon became obsolete. In 1924, Sun became a secondary defendant in the anti-trust suit against various holders of thermal cracking patents. Gasoline yields from the Cross units remained disappointing, since even these units could not effectively deal with high asphalt-based crudes. Automobile manufacturers had begun producing

[20] Giebelhaus, 1980, pp. 71, 75; Johnson, 1983, p. 12; Williamson, Andreano, Daum, and Klose, 1963, pp. 379-380, 382; J.H. Pew to H.E. Michener, May 19, 1924, Box 111, Series 1F.

cars with higher performance engines that required higher octane gasoline. In order to produce high octane gasoline, however, refiners had to add tetraethyl lead. Only one company, the Ethyl Gasoline Corporation, had the rights to manufacture the additive, and they charged a substantial royalty for the use of their product. J.H. quickly concluded the time had come for Sun to develop it own thermal cracking process. He directed a team of recently hired university-trained engineers and chemists under the supervision of A.E. Pew Jr. and Clarence H. Thayer to design a process that would use high asphalt content crudes and yield a gasoline that it did not require the addition of tetraethyl lead. Thayer, a practically trained refiner and engineering wizard whom Mason had brought with him from Standard of California in 1926, proved the lynch-pin of the development effort. By 1927, the new process went into operation at Marcus Hook, and the company introduced Blue Sunoco. Since the new gasoline did not require an additive, it sold at the same price as competitors' lower octane gasoline. Demand for Blue Sunoco soared, and J. Howard ordered Sun's construction engineering department to tear down and rebuild nearly all of the Toledo refinery and to refurbish one-third of Marcus Hook to accommodate the new process. As a result, training programs and operating and maintenance manuals became standard procedure throughout much of Marcus Hook and Toledo.[21]

**Accident Prevention:** From their establishment, Sun refineries were quite dangerous places to work, yet accident prevention did not become a major concern until 1924. In fact, J.E. Pew's 1897 letter to his uncle, J.N. Pew regarding a mishap at the Toledo refinery aptly summed up the company's early attitude; accident prevention equated to using common sense.[22]

This did not mean, however, that company officials paid absolutely no attention to safety matters. Early correspondence between the refineries and headquarters included some discussion of accidents. The amount of detail regarding such instances, however, varied from memo to memo. On occasion, individuals would initiate a safety-related measure, usually in regard to fire prevention. In 1897, J.E. informed his uncle that Toledo had purchased a few fire extinguishers and was attempting to use more iron in the construction of buildings that had a propensity to become oil-soaked. In 1909, J.N. noted that the embankments around Marcus Hook's crude and finished product tanks were too low and narrow and there was too much rubbish and dry grass around its various buildings.[23]

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[21] Enos, 1962, pp. 145-146; Giebelhaus, 1980, pp. 12, 75, 90, 178; A.E. Pew Jr. to J.H. Pew March 18, 1926, Box 122; E.M. Hughes to J.H. Pew, June 18, 1925, Box 115; J.H. Pew to H. Thomas, Oct. 23, 1925, Box 116, Series 1F; W.D. Mason to J.H. Pew, April 18, 1927, Box 55; Refinery Notes, June 1, 1936, Box 58, Series 4; Chronology of Marcus Hook Refinery, Sun Oil and Oil Industry-Marcus Hook Refinery File; Chronology of Toledo Plants, Sun Oil-History-Chronology File, recent acquisition, not processed.

[22] J.E. Pew to J.N. Pew, May 11, 1897, Box 55, Series 14.

[23] J.E. Pew to J.N. Pew, Oct. 27, 1897, Box 55, Feb. 1, 1899, Box 56, Series 14; Refinery manager to J N. Pew, Feb. 22, Mar. 18,1909; J.N. Pew to J.H. Pew, Nov. 11, 1909, Box 14, Series 1C.

Finally in 1911, the company began to implement more formal structures regarding safety. That year, J.N. saw an accident reporting form in *System Magazine*. He instructed an employee to modify the form as needed, reproduce it in triplicate, and distribute it to all company locations. Each facility was to keep two copies of the form and return one to headquarters. That same year, company expense and salary ledgers began to record systematically costs accrued on account of accidents. Obviously, accidents had become a frequent and costly enough occurrence at least to merit tracking.[24]

Other than this, Sun appeared to take little further action regarding safety for the next 13 years. In 1924, however, W.E. Soden, who oversaw the various machine and carpentry shops at Marcus Hook, received a letter from the Department of Labor and Industry requesting Sun to establish two safety committees at Marcus Hook. The first committee was to consist of three foremen and two workmen who were to meet weekly and formulate ways in which the refinery could reduce the number and severity of accidents. The second committee, comprised of a company executive, the plant superintendent, and one of his assistants, was to review the suggestions of the first group and implement those they felt had merit. The letter went on to state that as a reward for participation in the program, the refinery would receive a reduction in its insurance premiums. Soden thought the idea worthwhile and passed it along to plant supervisor, H.E. Michener, who in turn, presented it to J. Howard. Within hours of receiving the suggestion, J. Howard instructed Michener to set up the committees, and the practice soon spread to Toledo as well.[25]

By 1928, however, refinery and company officials acknowledged that the safety committees were not enough. The number and cost of accidents kept rising and the new refining processes, which involved extremely high pressures and temperatures, were fraught with danger. Therefore, safety engineers were added to the Marcus Hook and Toledo staffs and charged with the task of developing formal safety procedures and rules for the facilities.[26]

**Conflict and Resistance:** Managerial conflict and resistance accompanied the bureaucratization of the two refineries. Not surprisingly, disputes over what constituted "best practice" sprang up in nearly every area at Marcus Hook and Toledo. At times, the differences of opinion revolved around such broad issues as how to organize refining operations more efficiently. On other occasions, they focused on operational detail, including storage tank specifications, the prescribed methods for gauging storage tanks, the formulas used to determine losses during refining and storage, and the wording of employee letters. Such disputes involved not just department heads but J.N. Pew and later his sons, J.N. Jr. and J. Howard. Despite the ever-increasing size and

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[24] J.N. Pew to F. Cross, July 19, 1911, Box 15, Series 1C; Marcus Hook Accounts Ledger, Vol. 31, Accession 382.

[25] W.E. Soden to H.E. Michener, H.E. Michener to J.H. Pew, J.H. Pew to H.E. Michener, April 24, 1924, Box 111, Series 1F.

[26] S.B. Eckert to District and Regional Managers, July 24, 1930, Box 912, Series 6, Inventory #2.

complexity of Sun operations, the Pew's need for control drove them to remain heavily involved in daily operations. As J. Howard stated in a speech during the late 1930s; "Too much diffusion of managerial authority and responsibility carries with it the danger of complexity of red tape, of weakening authority, and in the vernacular too much buck passing" [quoted in Johnson, 1983, p. 21].

Particularly in regard to refining, the arguments the disputants used over best practices changed significantly between 1895 and 1929. Initially, most based their claims on possessing more first-hand knowledge and experience or on the practices of other refiners. Only J.E. Pew appeared to use empirical data. During the 1920s however, one or more of the conflicting parties would support their arguments with statistics. In large measure, this change occurred because Sun's entrance into the gasoline business exponentially increased the amount of data the company formally recorded and distributed to its various managers.

Despite the bureaucratization of most refinery activities by the late 1920s, conflict resolution remained informally organized. The unstated rule seemed to be that the "warring parties" were to meet face to face and reach an agreement acceptable to all concerned. If they could not resolve their differences, they could appeal to whoever had authority over all those involved in the dispute. Custom also appeared to dictate that as often as possible, this individual was to assume the role of mediator rather than judge.[27]

Just as conflict accompanied bureaucratization, so did managerial resistance. On numerous occasions, managers at all levels, including even top ranking officials, refused to abide by the rules and procedures imposed on them by others. In 1924, J. Howard instructed Marcus Hook supervisor, H.E. Michener, to ignore an ICC mandate regarding tank car brake specifications because complying with the minor revision would require the company to make very costly modifications. In 1927, J. Howard admitted that he frequently ignored the capital appropriations system he, himself, had authorized in 1924.

How one dealt with managerial noncompliance varied from situation to situation and apparently had little to do with the potential harm such refusal might engender. When the supervisor of the Marcus Hook barrel house refused to comply with the barrel numbering system J.N. Pew had devised, J.N. instructed J. Howard to do whatever he deemed necessary to assure future compliance, including firing the man. Yet in response to reports of entire departments not complying with safety rules and procedures, Sun officials

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[27] R. Pew to J.N. Pew, Dec. 21, 1894, Box 18, Mar. 28, 1895, Box 19, Jan. 30, 1897, Box 22; J.E. Pew to J.N. Pew, Jan. 3, 1899, Box 56, Series 14; R. Pew to J.N. Pew, date unknown, Box 4, May 24, 1900, Box 5, Series 1A; J.H. Pew to J.N. Pew, Mar. 29, 1909, March 10, 1910; J.N. Pew to J.H. Pew, Feb. 22, 1910, Box 14, Series 1C; E.M. Hughes to J.H. Pew, Mar. 19, 1926; J.H. Pew to E.M. Hughes, Mar. 20, 1926, Box 122; J.N. Pew Jr. to M.H. Leister, Nov. 10, 1926, Box 123; S.B. Eckert to J.H. Pew, Mar. 20, 1926; J.N. Pew to R.S. Reitzel, Aug. 10, 1926, Box 126; W.D. Mason to J.H. Pew, J.H. Pew to W.D. Mason, Mar 24, 1927, Box 128, Series 1F.

implemented a "safety first" campaign. Apparently those who supervised the resistant manager lived by the rule, "handle as you see fit."[28]

This extended discussion of Sun refinery activities raises a number of observations regarding business bureaucratization that either contradict or add significant complexity to Chandler's and even his challengers' views of the process. Family ownership and domination do not preclude bureaucratization. Bureaucratization often occurs in fits and starts. While some areas within a firm may establish formal structures and procedures quickly, others may lag well behind. The factors spurring and hindering bureaucratization encompass both internal and external, economic and non-economic considerations, including: varying managerial attitudes to bureaucratization and control; changing product demand; the nature of the firm's raw materials and the technologies available to process them; the profit margins associated with the firm's various outputs; and the company's exposure to regulation. Both university and practically trained individuals at all management levels contribute to bureaucracy or may resist its mandates. Bureaucratization entails managerial conflict and resistance. Conflict often manifests itself as debates over what constitutes "best practice." Managerial resistance frequently takes the form of non-compliance and is exhibited by managers at all levels. Even bureaucratized firms can effectively deal with such conflict and resistance using informal mechanisms.

## Perrow's Approach – Caveats and Concluding Thoughts

While the Sun Oil case clearly demonstrates that a fairly complex and robust depiction of bureaucratization emerges from the application of Perrow's model, the approach is not without its practical problems and theoretical weaknesses.

Employing Perrow's framework requires patience and creativity. Dealing with firms on a daily operating basis is difficult to accomplish since most companies do not save this type of material. If one does find a firm's routine operating papers, reviewing them is extremely time-consuming. One has to deal with large volumes of paper and lots of mundane detail that requires careful reading because goals and procedures are often buried in the text. To add further complication, informal practices are difficult to identify since by their very nature, they are often not written down. Yet at times, they are mentioned in memos arguing for the establishment of formal procedures and in reports summarizing progress on non-routine matters as well as in personal correspondence, diaries, oral interviews, and internal and external publications describing company activities.

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[28] R, Pew to J.N. Pew, Mar. 12, 1896, Box 20; Toledo Refinery to J.N. Pew, June 30, 1899, Box 24, Series 14; F. Cross to A. Pomeroy, Nov. 20, 1901, Box 222, Series 1M; J.N. Pew to J.H. Pew, June 7, 1911, Series 1C; J.H. Pew to H.E. Michener, May 15, 1924, Box 111; J.H. Pew to W.D. Mason, June 20, 1927, Box 128, Series 1F; "Open Letter to Employees," *Our Sun* 7 (1930) 14, Hagley Imprints Collection.

More importantly, Perrow's model has major theoretical flaws. As even Perrow notes, his approach does not adequately deal with the environment, particularly its social and cultural dimensions [Perrow, *A Framework,* 1967, pp. 202-203]. While his societal and output goals represent his attempt at incorporating such considerations into his framework, he provides little more detail [Perrow, *Organizational Goals,* 1968, p. 306]. One has to review most of his writings to garner any sense of what he would include in an environmental analysis. In one instance he observes that companies can select the environment they wish to deal with, create new environments, and change those that threaten them through such techniques as pricing, government aid, and advertising [Perrow, 1974, p. 41]. On other occasions, he points out that such factors as political and regulatory efforts, the competitive environment, and workforce composition limit what individuals view as acceptable goals, technology, and even forms of organization. In turn, influential individuals within organizations help determine what society perceives as viable company goals, practices, and procedures [Perrow, 1965, pp. 914-915; *Complex Organizations,* 1970, pp. 96-97, 118-121, 130-132, 172; 1978, pp. 262-265; 1986, p. 77]. While helpful, such scattered and general observations do not constitute a systematic or comprehensive method for dealing with the interaction of the environment and the organization.

Much the same can also be said about the other oversight Perrow recognizes in his own approach – the issue of power. As noted previously, this problem became so disconcerting to Perrow that he rejected his initial model and began developing a framework based solely on power [Perrow, *Three Types,* 1977, p. 101; 1978, p. 106; 1981, p. 382; 1986, pp. 11-12, 381; Perrow and Guillen, 1990, p. 131]. Yet, even his post-rejection scholarship provides little insight into the power aspect of organization. While he argues that people inside and outside the firm have the power to define its goals, technologies, and ways of organizing, he is unclear about what he means by power. In one instance, he equates power with the concentration of wealth [Perrow, 1981, p. 382], while in another, he defines power as having the discretion to determine how one will perform his/her assigned task and mobilize resources [Perrow, *A Framework,* 1967, pp. 198-199]. In dealing with varying levels of departmental and managerial power, however, he argues that people have divergent definitions of power and that even a single individual may hold multiple definitions, depending on the circumstances [Perrow, *Departmental Power,* 1970, pp. 67, 74, 82-83].

Also embedded in some of his limited discussions of power and the environment is a third theoretical problem with his framework – the role of individuals and groups in bureaucratization. Throughout his works, Perrow is of two minds. As noted above, he asserts that people inside and outside the firm affect its organization. In fact, he argues that the personality of top executives helps shape company goals [Perrow, *Organizational Analysis,* 1970, p. 172]. At other times, however, he stresses that individuals are of lesser importance because organizational structures limit employees' impact on the firm. Therefore one should focus on structure rather than individuals [Perrow, *Organizational Analysis,* 1970, p. vii; 1978, p. 20]. Yet as the Sun example

illustrates, agency matters; individuals have a significant impact on bureaucratization. J.N. Jr.'s and J.H. Pew's opinions and the employment of such individuals as William Mason all affected the company's rate of bureaucratization.[29]

What these theoretical weaknesses suggest is that although Perrow's neo-Weberian model allows one to develop a more thorough-going understanding of bureaucratization, even his model is inadequate. Perrow's omissions regarding the role of the environment, power, and the individual in bureaucratization indicate the need also to employ the models of managerial, social, and cultural theorists. As Perrow observes, "Theories shape our world; they encourage us to see it a certain way, and then we exclude other visions that could direct our actions" [Perrow, 1986, p. 235]. Business historians can ill afford to be so exclusionary as to rely solely on the work of a single theorist, be it Chandler, one of his current challengers, or even Perrow. Business bureaucratization is a multidimensional process which no single theory can realistically encompass. Thus while some may say, "Been there. Done that," others need to reply, "There is still much work to be done."

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