



# The Persistence of Bureaucracy: A Meta-analysis of Weber's Model of Bureaucratic Control

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## Abstract

The model of bureaucratic control is an enduring part of modern organizational theory. This study draws on almost four decades of empirical research in assessing the general validity of the model. Meta-analytical techniques are used for estimating the general relationships among key aspects of bureaucratic control, removing the effects of statistical artefacts and exploring the relative persistence of the model. The results provide substantial support for the model of bureaucratic control. The average correlation among the structural variables is .54. Overall, the paper concludes that there are reasons to see the bureaucratic model of control as generalizable and of continuing relevance to discussions of organizational structures.

**Keywords:** bureaucratic control, bureaucracy, formal structure, meta-analysis, organizational structure, structural contingency theory

More than three-quarters of a century ago, Weber's writings on bureaucracy stimulated key streams of research into the functioning of organizations. According to Gerth and Mills, Weber 'could not but recognize the inevitability of bureaucratic management in public administration, in large capitalist enterprises, and in politically efficient party machines' (1946: 50). The emergence of bureaucratic management is explored in this article by examining the general validity of Weber's (1946) theory of bureaucratic control as revealed in empirical investigations conducted during the later half of the 20th century.

The article focuses on the strength of relationships among core aspects of formal structures within the model of bureaucratic control. Weber's (1946) theory of bureaucracy addresses the merits of administrative structures relying on rational-legal authority as a basis for governing activities in organizations. In this theoretical tradition, formal organizations are conceived as instruments for achieving specific goals, developing administrative mechanisms for maintaining their organization and coordinating their required activities (Blau and Scott 1962). The major characteristics of bureaucracy include a fixed division of labour, a hierarchy of positions and authority, administration based on written documents and adhering to general rules, thorough and expert training of personnel, and full-time commitment to official activities (Weber 1946).

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This focus is driven by the centrality of these relationships to organization theory, structural functionalism, structural contingency theory and comparative organizational analysis. General agreement exists in this sociological tradition that formal structures refer to deliberate patterns of activities in organizations and evidence supports their multidimensionality (Blau 1970; Hall et al. 1967; Holdaway et al. 1975; Inkson et al. 1970b; Pugh et al. 1968). Theories of organization provide frameworks for explaining relationships among internal characteristics of organizations such as differentiation, decentralization, standardization, integration and coordination (Donaldson 1985: 119). Theories of structural functionalism relate formal structures and their situational antecedents to aspects of functioning including 'adaptation, goal attainment, integration, and latency' (Donaldson 1985: 56; see also Hage 1965), often focusing on 'system outcomes such as production, efficiency, or rates of innovation' (Donaldson 1985: 119; see also Child 1972b). Structural contingency theory and comparative organization analysis, on the other hand, address relationships between formal structures and situational variables, developing theories and empirical tests of variation in formal structures and the conditions of such variation (Child 1972a).

Early notions of organizational structures focus on abstract formal relations governing activities in social settings (Barley 1986). These notions of formal structures as constraining activities characterize the emergence of organizations as a field of study during the 1940s (Scott 1981). Elaborations of formal structures increasingly relied upon Weber's (1946) theory of bureaucratic control. Early research focused on the consequences of departures from Weber's ideal type of bureaucratic control (Gouldner 1955; Merton 1940; Prethus 1961; Selznick 1949). Gouldner (1948), however, laments the inattention to empirically verifying the attributes of bureaucratic control identified by Weber. This prompted research into the degree to which bureaucratic attributes are found in organizations (Hage 1965; Hall 1963; Pugh et al. 1963; Udy 1959). Subsequent debates focus on conceptions of formal structures and the composition of structural types (Blau 1974; Hall et al. 1967; Indik 1968; James and Jones 1976; March and Simon 1958; Prien and Rowan 1971; Pugh et al. 1968; Sells 1963; Thompson 1967). However, agreement on a core set of structural variables remains elusive. Research typically addresses some, but not all, aspects of formal structures (Donaldson 1998), and the variety of conceptions often produces mixed results (Heydebrand 1973; James and Jones 1976; Kostecki and Mrela 1983; Walton 1980).

Research attention quickly switched from exploring the presence of attributes of bureaucracy in organizations, to the antecedents and consequences of variations in formal structures, and structural contingency theory emerged (Lawrence and Lorsch 1967). In its basic form, structural contingency theory proposes that variations in formal structures relate to variations in contingencies such as size, strategy, technology and environment. Further, that levels of organizational effectiveness depend on the fit between structures and contingencies (Donaldson 2001; Pennings 1992). That is, for each level of a contingency some level exists for each structural variable that leads to high performance. Weber's (1946) model of bureaucratic control provides one

approach to comparing the extent to which structural characteristics are found in organizations. Thus, structural contingency theory asserts that the level to which organizations exhibit characteristics of bureaucratic control depends on the level to which their operating conditions exhibit particular contingencies.

By the early 1980s, structural contingency theory was seen as addressing interesting phenomena, as non-controversial, and widely accepted (Pfeffer 1982). Indeed, 'the contingency approach seems so obviously correct that we are not likely to give it up easily' (Scott 1977: 90). Recently, structural contingency theory has been characterized as no longer novel, too complicated for either scholastic understanding or managerial use, and increasingly divorced from practice (Pfeffer 1997). However, not all scholars share this pessimistic assessment (Donaldson 2001). The original issue in structural contingency theory focused on 'understanding organizational structures in the service of developing the science and practice of organizational design' (Pfeffer 1997: 198). It remains important for theoretical, empirical and practical reasons. The model of bureaucratic control discussed herein reduces many variables and relationships to a few relationships among key variables of formal structures. Hence, the topic becomes tractable rather than hopelessly complex (Donaldson 2001). Structural contingency theory occupies a prominent position in organization theory (Donaldson 1995; Pennings 1998). Its most important sub-stream, focusing on strategy–structure–performance relationships, exhibits widespread acceptance (Donaldson 2001; Galunic and Eisenhardt 1994).

Continuing theoretical interest in formal structures as critical antecedents is shown in models of performance in educational and health care settings (Dornbusch et al. 1996; Zinn and Mor 1998), and of innovation and change in organizations (Hage 1999). Formal structures also have been implicated in producing mistakes, misconduct and disasters in organizations (Vaughan 1999). Additionally, formal structures 'are prime candidates to be used as contextual variables in a meso approach to the study of behaviour in organizations' (House et al. 1995: 75; Pennings 1992). For example, formal structures appear as critical antecedents in models of team work, outcomes and group effectiveness (Crown 2000; Goodman et al. 1987; Shea and Guzzo 1987). Formal structures attract continuing interest in empirical investigations of structures, contexts, personnel practices and performances of organizations (e.g. Child and McGrath 2001; Ghoshal and Westney 1993; Kalleberg et al. 1996; Martinez and Jarillo 1989). Research on formal structures also remains important as practical applications of the model of bureaucratic control continue and many alternatives to it have emerged in recent times (Gazell and Pugh 1990: 827). Thus, the variations bureaucracies and their formal structures may take remain salient issues. They continue dominating modes of organizational design, and structural contingency theory appears sufficiently broad to accommodate their explanation (Pennings 1998).

This study focuses attention on formal structures, providing an empirical synthesis of findings about relationships among core variables. Demonstrating the general validity of these relationships would provide a sound basis for integrating them into studies of other interesting phenomena in organizations. The study focuses on the strength of relationships among structural variables.

It does not address the level to which these variables are found, or persist, in organizations. Weber's conjectures about the inevitability of bureaucracy are addressed by exploring whether the strength of relationships endures over time. Researchers have continually used the bureaucratic model in empirical studies, so that empirical results continue to accumulate, thereby prompting the need for the present research integration. The pursuit of this topic over decades also provides a rare opportunity for assessing the generalizability of a social science theory over many data sets, settings and time periods. Meta-analytical techniques are used for estimating overall relationships among structural variables, particularly the strength and generalizability of these relationships (Hunter and Schmidt 1990).

Only six meta-analytical reviews appear in the organizational literature. These examine relationships of organizational size with formal structures (Donaldson 1986; G. Miller 1987), performance (Gooding and Wagner 1985), and innovation (Damanpour 1992), of structure with technology (Miller et al. 1991) and of performance with organizational configurations (Ketchen et al. 1997). Continuing this focus on examining variation in relationships over studies, this study begins with a discussion of the major variables in formal structures. Hypotheses linking these variables develop from a discussion of theory and associated empirical tests. Issues highlighted in the discussion identify potential mechanisms that may yield different patterns of structural relationships over time.

### **Structural Relationships**

The present study examines relationships among the primary characteristics in Weber's (1946) model of bureaucratic control using widely studied variables such as differentiation, standardization, decentralization and formalization. Differentiation is defined as 'the number of structural components that are formally distinguished' on any basis that divides members into positions, ranks or subunits (Blau 1970: 204). Task specialization, vertical differentiation and horizontal differentiation are three aspects of differentiation included in the present study. Each focuses on the segmentation of labour in defining the division of labour in organizations (Carter and Keon 1986; Dewar and Hage 1978) and is a hallmark of bureaucracy theory (Donaldson 2001). Task specialization defines the subdivision of activities within organizations on the basis of positions (Carter and Keon 1989). For example, the division of labour is defined by the number of job titles in an organization (Blau and Schoenherr 1971), or role specialization, the extent to which specialist roles exist within each functional specialism (Pugh et al. 1968). Vertical differentiation, activity segmented on the basis of ranks, defines the number of hierarchical levels in an organization. Horizontal differentiation, activity segmented on the basis of subunits, defines the number of subdivisions or specialities within an organization.

Hypothesized relationships among task specialization, vertical differentiation and horizontal differentiation rely on arguments advanced by Blau.

Responsibilities and activities become subdivided into positions in facilitating work in organizations (Blau 1970). This differentiated activity is central to understandings of organizations. Limiting the scope of activities through specialization heightens performance outcomes and improves control over activities (Blau 1970: 71). Increasing expertise through specialization also broadens responsibilities of experts, narrowing managers' spans of control and increasing the number of managerial levels (Blau 1968: 461).

Grouping similar organizational activities into positions, and grouping related positions into levels and subunits, enhances homogeneity within structural components and heterogeneity between them (Blau 1970; Blau and Scott 1962; Weber 1946). Increasing homogeneity of activities within levels and subunits heightens the performance and control of those activities. Hierarchical structures of positions improve coordination by restricting free-flowing communications within components (Blau and Scott 1962: 139). Thus, hierarchical levels and subunits, each focusing on particular activities, develop as partial responses to performing, controlling and coordinating increasingly differentiated activities. However, coordination across diverse structural units becomes more complicated (Blau 1970; Blau and Schoenherr 1971; Hage 1965).

Weber (1946) argues that authority needed for performing activities is distributed to those positions containing them. As a result, levels of authority permeate hierarchies in organizations. Decentralization is defined as the distribution of authority for making decisions affecting an organization (Pugh et al. 1968). In more decentralized organizations, decision-making authority is distributed among more positions throughout the hierarchy. As differentiation proceeds in organizations, responsibilities and authority for particular activities become distributed among an increasing number of positions, hierarchical levels and subunits (Blau 1968: 465). Weber's analysis explicitly limits authority for associated activities to positions by prescribing duties and standardizing associated procedures and regulations (Blau and Scott 1962: 34; Child 1972b: 163). Moreover, restricting discretion is also important when employees lack skills needed for exercising discretion and responsibilities, or incentives are inadequate for encouraging the exercise of discretion (Blau and Scott 1962: 186). Thus, standardization also emerges in organizations as limits on authority are imposed in the process of decentralizing decision-making.

Standardization defines the extent of coverage and application of operating procedures, rules and regulations uniformly in organizations (Price and Mueller 1986; Pugh et al. 1968). Weber (1946) also asserts that rules and regulations order divisions of labour. Thus, standardized rules, regulations and procedures accumulate in organizations as activities become more specialized and differentiated (vertically and horizontally). These standardized rules and procedures provide guides for members in performing and coordinating differentiated and interdependent activities (Blau and Scott 1962: 183). They also provide repositories of experience in organizations that are available subsequently, often becoming documented and filed (Hage 1965; Weber 1946). Specialists also introduce procedures for regulating their activities, further increasing standardization and formalization (Pugh et al. 1968: 82).

The final characteristic addressed here follows from Weber's (1946) assertion that administration relies on written and filed documents. Formalization is defined as the degree to which rules, procedures, regulations and communications are written and filed (Pugh et al. 1963). Formalization appears in organizations as standardized rules and procedures, emerging in the processes of differentiating activities and decentralizing authority, become documented and filed. The development of other impersonal mechanisms of control, such as written communications, written selection criteria and written performance records, also enhances formalization in organizations. These become substitutes for personal supervision and direct control of activities (Blau 1968; Blau and Scott 1962). Indeed, designing impersonal mechanisms that provide indirect control has been described as management's primary function (Blau and Scott 1962: 185). Hence, increasing regulation of organizational activities by impersonal control mechanisms diminishes direct executive control.

In summary, organizational structure refers to the arrangement of activity patterns in organizations. These activity patterns cluster into positions, levels, functions, departments, or divisions. Responsibilities and authority for particular activities become distributed among an increasing number of positions, hierarchical levels and subunits. Standardized rules and procedures provide guides for members in performing and coordinating these differentiated and interdependent activities. This division of labour creates interdependencies among activities. These interdependencies are managed, in part, through the hierarchy of authority, supplemented through standardizing rules and procedures and supported by documenting procedures, regulations, rules and other prescriptions (Pennings 1992). The preceding discussion supports the following general hypothesis.

*Hypothesis 1: Task specialization, vertical and horizontal differentiation, decentralization, standardization and formalization are positively related to each other.*

### **Bureaucratic Persistence**

According to Weber, bureaucracy is one of the hardest social structures to destroy, once it is fully established, and 'the idea of eliminating these organizations becomes more and more utopian' (Weber 1946: 229). In contrast, predictions of the demise of bureaucracy highlight its inability to cope with bureaucratic pathologies, technological determinism, organizational humanism, or democratization (Gazell and Pugh 1990). Such predictions have not been particularly accurate because of ambiguities in the notion of 'the demise of bureaucracy'. Additionally, forecasters may have overestimated the extent of environmental instability and underrated bureaucracy's adaptability (Gazell and Pugh 1990). Moreover, many of these forecasts appear to derive from the idea that decision-making in bureaucracies is centralized, not decentralized. Consequently, bureaucracies would fail as operating contexts generate pressures for decentralized decision-making.

However, Mansfield (1973: 477) asserts that Weber (1946) never suggests that centralized decision-making characterizes bureaucracy. He suggests that Weber's model of bureaucratic control implies decentralized decision-making. Considerable empirical research supports this portrayal of decision-making in bureaucracies as decentralized (e.g. Blau and Schoenherr 1971; Pugh and Hickson 1976). Hence, demands for further decentralization are likely to nurture the development of the bureaucratic form. Indeed, the dramatic increase in the prevalence of bureaucracies since 1970 has been documented by Gazell and Pugh (1990). They contend 'this expansion will likely continue for the rest of the century' (Gazell and Pugh 1990: 827).

However, alternatives to the bureaucratic form have increasingly emerged. These include flattening of organizational hierarchies through delayering, temporary structures such as adhocracies, task forces and project teams, as well as permanent structures such as quality circles and matrix forms (Gazell and Pugh 1990). Other new organizational forms rely on flexible work systems, building in employee involvement through new technology, inventory control, job enlargement, self-managed teams and quality control (Smith 1997). More recent forms rely on developing external networks through outsourcing and strategic alliances. These forms also develop internal networks of activities linked through information technology, emphasizing decentralized decision-making and non-hierarchical forms of coordination and control (Clegg and Hardy 1996).

These new forms are likely to alter the bureaucratic model in several ways (Clegg and Hardy 1996; Gazell and Pugh 1990; Smith 1997). Flattened hierarchies, temporary structures, flexible work systems and networked activities are thought to decrease levels of task specialization as employees become engaged in a greater range of interconnected activities. Levels of vertical and horizontal differentiation are reduced by the removal of hierarchical levels, the redesign of work systems and the emergence of internal networks. These new forms are expected to increase levels of decentralization as employees become more engaged in a greater range of activities and are provided with appropriate information. One consequence of these developments is a reduction in the range of scores observed on task specialization, as well as vertical and horizontal differentiation, and decentralization. Thus, relationships among these variables are likely to be smaller. Moreover, the bureaucratic model predicts positive relationships of these variables with standardization and formalization. Thus, these new organizational forms are likely to weaken the strength of all relationships in the bureaucratic model. Hence,

*Hypothesis 2: Relationships among task specialization, vertical and horizontal differentiation, decentralization, standardization and formalization become weaker over time.*

## Methods

Meta-analysis is a statistical procedure for estimating population effect sizes by combining effect sizes reported in a collection of primary studies (Hunter and Schmidt 1990). It also isolates effects of statistical artefacts and moderators on those relationships. The present meta-analysis estimates population correlations among variables of formal structure. These estimates are then corrected for artefactual variance due to sampling error, range restriction on independent variables, and measurement error in both variables. Finally, moderator analysis tests for effects of time on those estimates.

### Search Procedures

The present search focused on primary studies published between January 1960 and December 1999 reporting empirical relationships among structural variables. A three-step procedure identified studies relevant to these relationships. First, a systematic and extensive search was conducted of six computerized databases, using the keywords 'formal structure', 'organization structure', 'differentiation', 'complexity', 'specialization', 'standardization', 'formalization' and 'centralization'. These databases included ABI/INFORM (1960–1999), Psych Info (1984–1999), ERIC (1965–1999), Sociofile (1974–1999), Social Sciences Citation Index (1983–1999) and Wilson Social Sciences Abstracts (1984–1999). Second, 11 academic journals were searched manually from 1960. These were *Administrative Science Quarterly*, *Academy of Management Journal*, *Academy of Management Review*, *American Journal of Sociology*, *American Sociological Review*, *Human Relations*, *Journal of Management*, *Journal of Management Studies*, *Research in Organizational Behavior*, *Strategic Management Journal*, and *Organization Studies*. Third, studies not identified by the first two steps were extracted from bibliographies and reference lists in relevant books and articles.

These databases were searched by the author and an assistant, independently. The search procedure identified 79 empirical studies. Each person selected a common set of 56 studies, representing 71% agreement on the total set of 79 studies. The assistant overlooked 12 studies, and the author excluded 11 studies as they used redundant data sets (7), or a different level of analysis (4). The differences were resolved through discussion, with the final selection containing 68 (56 + 12) primary studies reported in 64 publications. These publications clearly indicated necessary descriptive data, and reported zero-order correlations for at least one of the relationships that were not available in other publications. Subsequently, ambiguous descriptions of measures were found in four studies from three publications and these were excluded from the analysis. Thus, 64 primary studies, reported in 61 publications, are included in this meta-analysis.

Characteristics of empirical studies excluded from this meta-analysis included those (1) employing definitions of structural variables different from those adopted in this review (e.g. Kimberly 1976); (2) adopting units of analysis such as individuals (e.g. Lee and Ashforth 1991; Sutton and

Rousseau 1979), work groups (e.g. Drazin and Van De Ven 1985; Gresov 1989, 1990; Lee and Ashforth 1991; Mohr 1971; Van De Ven and Ferry 1980) or professional groups (Hall 1967); (3) reporting statistics other than product moment correlations (e.g. Ashmos et al. 1996; Blau et al. 1976; Kmetz 1978; Lincoln et al. 1986); (4) reporting relationships among composites of structural variables (e.g. Inkson et al. 1970a; Martin and Glisson 1989); (5) reporting relationships from the same data set available in publications included in this meta-analysis (e.g. Birnbaum and Wong 1985; Blau 1968; Droge and Germain 1998; Glisson and Martin 1980; Miller et al. 1988; Yasai-Ardekani 1989).

Coding Studies

Year of data collection was used in estimating the effects of time on relationships. In most cases, this information was taken directly from each study. For some studies lacking this information, year of data collection was taken from other publications on the same data set. For the remaining studies, year of data collection was estimated by subtracting from year of publication the average lag between data collection and publication for the 46 studies providing both dates. The average year of publication for the sample of 64 studies was 1980 while the average year of data collection for the subgroup of 46 studies was 1973 (see Table 1). The average lag between data collection and publication for these 46 studies was 5 years. The earliest study was published in 1963, while the latest was published in 1997. However, the earliest data collection occurred in 1961, while the latest was estimated to be 1992. Data were collected before 1990 for 61 of the 64 studies. The complete list of studies is shown in Appendix 1.

| Decade    | Reported publication | Reported data collection <sup>a</sup> | Estimated data collection <sup>b</sup> |
|-----------|----------------------|---------------------------------------|----------------------------------------|
| 1960–1969 | 3                    | 14                                    | 16                                     |
| 1970–1979 | 34                   | 24                                    | 33                                     |
| 1980–1989 | 19                   | 7                                     | 12                                     |
| 1990–2000 | 8                    | 1                                     | 3                                      |
| Total     | 64                   | 46                                    | 64                                     |
| Mean      | 1980                 | 1973                                  | 1975                                   |
| s.d.      | 7.5                  | 6.5                                   | 7.2                                    |
| Median    | 1979                 | 1972                                  | 1973                                   |
| Earliest  | 1963                 | 1961                                  | 1961                                   |
| Latest    | 1997                 | 1991                                  | 1992                                   |

Table 1.  
Collection and  
Publication of Data  
(1960–2000)

<sup>a</sup> The year of data collection is taken from publications of the data set.  
<sup>b</sup> Includes some data collection dates estimated by subtracting from the publication year the average lag between data collection and publication for the 46 studies providing both dates (5 years).

Coding Measures

Examining researchers' measures and their labels, as well as citations to the origins of those measures identified 85 unique measures of the six structural variables. A measure was considered unique where its content differed from similar measures by a single item. Two people independently classified each measure into one of the six structural variables, reaching agreement on 98% of the classifications. Differences were resolved through discussion and reference to the articles in question. As explained below, 29 measures were combined into 13 composite measures. The distribution of the total 98 measures over the six structural variables is shown in Table 2. On average, each measure was used in 3.3 studies in this meta-analysis.

All measures with the same operational definition of a structural variable were grouped together, including modifications to original measures by changing the wording of items or altering the number of items. For examples, subsequent modifications of the original 16-item measure of functional specialization contained 9 to 22 items (e.g. Azumi and McMillan 1981; Bresser 1984; Heydebrand and Noell 1973). Measures of task specialization include role specialization (e.g. Blau and McKinley 1979; Moch 1976; Palumbo 1969; Pugh et al. 1968), the number of job titles (e.g. Blau and Schoenherr 1971; Bresser 1984; Conaty et al. 1983; Ford 1979; Hull and Collins 1987), perceived role routine (e.g. Atwater 1995; Dewar and Werbel 1979; Glisson 1978; Hall 1963; Inkson et al. 1970a; Jennings and Seaman 1994; Sathe 1978) and functional diversification (Sathe 1978). Measures of vertical differentiation include the number of levels (e.g. Blau and Schoenherr 1971), the number of levels in the longest line (e.g. Blau and Schoenherr 1971; Goldman 1973; Pugh et al. 1968) and the average number of levels (e.g. Aiken and Bacharach 1978; Ford 1979). Measures of horizontal differentiation include functional specialization (Pugh et al. 1968) and the number of subunits (e.g. Blau and Schoenherr 1971).

Measures of decentralization focus on the locus of authority for making anywhere from five to 60 organizational decisions (e.g. Geeraerts 1984; Germain and Droge 1997; Pugh et al. 1968; Shrader et al. 1989; Tayeb 1987), policy and resource allocations (Blau 1973; Moch, 1976; Shrader et al. 1989) and delegation of decision-making (e.g. Blau and Schoenherr 1971;

Table 2.  
Number of  
Measures of  
Structural Variables  
and Their Use in  
Studies

| Structural variables       | Measures |          |       | Studies |          |       |
|----------------------------|----------|----------|-------|---------|----------|-------|
|                            | Unique   | Combined | Total | Unique  | Combined | Total |
| Task specialization        | 15       |          | 15    | 29      |          | 29    |
| Vertical differentiation   | 3        |          | 3     | 27      |          | 27    |
| Horizontal differentiation | 11       | 1        | 12    | 46      | 1        | 47    |
| Decentralization           | 18       | 6        | 24    | 33      | 6        | 39    |
| Standardization            | 16       | 3        | 19    | 21      | 3        | 24    |
| Formalization              | 22       | 3        | 25    | 47      | 4        | 51    |
| Total                      | 85       | 13       | 98    |         |          |       |

Khandwalla 1977; Meyer and Rowan 1977; Reimann 1973; Wally and Baum 1994). Measures of standardization include overall standardization (e.g. Donaldson and Warner 1974; Greenwood and Hinings 1976a; Pugh et al. 1968) and standardization of personnel procedures (e.g. Atwater 1995; Conaty et al. 1983; Holdaway et al. 1975). This group of measures also includes standardization of procedures relating to task and image (Badran and Hinings 1981; Bresser 1984), planning (Child and Kieser 1979; Wally and Baum 1994), controls (Khandwalla 1974; Khandwalla 1977), as well as job and general standardization (e.g. Dewar and Werbel 1979; Glisson 1978; Hall 1963).

Measures of formalization include overall formalization with its variants (e.g. Bresser 1984; Donaldson and Warner 1974; Holdaway et al. 1975; Pugh et al. 1968), formalization of role definition and its modifications (e.g. Badran and Hinings 1981; Inkson et al. 1970a; Tayeb 1987), written rules and regulations (e.g. Atwater 1995; Hull and Collins 1987), perceived role formalization (Child and Kieser 1979; Inkson et al. 1970a, b), formalization of personnel regulations (Armandi and Mills 1982; Blau and McKinley 1979; Blau and Schoenherr 1971; Meyer and Brown 1977) and reference to written guidelines (Palumbo 1969; Paulson 1974; Shrader et al. 1989).

The 275 correlations in this meta-analysis were derived from 341 correlations reported among the six structural variables. Single indicators of structural variables were available in most studies. The 245 correlations among these indicators were included directly into the analysis. Multiple indicators of some structural variables were available in 13 studies. However, their inclusion directly into the analysis would violate the statistical independence among correlations necessary for the analysis. In maintaining statistical independence, correlations among these indicators were combined using one of three procedures outlined by Hunter and Schmidt (1990: 451–463). These 30 within-study correlations were derived from 96 correlations among multiple indicators and structural variables (see Appendix 2). A further 99 correlations were discarded as they involved duplicate measures of the same variable such as subscales and alternative measures.

### **Analytical Procedures**

Meta-analyses were conducted using procedures described by Hunter and Schmidt (1990). Sampling error, measurement error and range restriction are among statistical artefacts that change the size of a correlation in a study from its population value. Artefacts introduce variation in correlations over studies, when there is none in the population. Thus, artefacts affect estimates of population correlations obtained in studies. Moreover, variation in correlations over studies may be interpreted erroneously as indicating substantive differences in findings across studies. For each primary study, sampling error is a random event so that the study correlation varies randomly from the population value. The size of sampling error is determined primarily by sample size, with smaller samples having larger sampling errors. Fortunately, sampling errors in primary studies cancel out in the average correlation over studies. However, they add to the variance of correlations across studies. Thus,

average correlations provide an estimate of population values and the variance of population values can be estimated by subtracting sampling error from the observed variance in correlations across studies (Hunter and Schmidt 1990).

Measurement error in either variable causes their correlation to be lower than that obtained with perfect measurement (Hunter and Schmidt 1990). Correcting correlations for measurement error in a variable requires knowledge of the reliability of the variable. Range restriction on a variable occurs when the range of scores in a study does not cover the range of scores in the population. No correction for range restriction is needed where the distribution of scores is similar for each study. However, marked differences in the distribution on a variable over studies produce variation in correlations over those studies. This is because differences in standard deviations generate differences in correlations. Differences over studies in the distribution on one of the variables may be producing the variation observed in correlations. Correcting correlations for range restriction on the independent variable involves computing correlations as if studies were done with the same standard deviation. This requires information about the standard deviation in each study and some reference population (Hunter and Schmidt 1990).

The population correlation for each structural relationship was estimated from the average of study correlations weighted by their sample sizes. The estimate of the variance for each population correlation was calculated by subtracting the sampling error variance from the observed variance in correlations across studies (Hunter and Schmidt 1990: 100–109). The estimates of the population correlation and its variance were then adjusted for the effects of measurement error and range restriction in each relationship. Corrections to correlations for measurement error on both variables and range restriction on the independent variable were calculated using procedures described by Hunter and Schmidt (1990: 158–169). Artefact distributions were used in correcting for measurement error and range restriction, as information about them was not available for each study. Distributions of reliability on each variable and range restriction for the independent variable were compiled from information available in some studies. This information was then used to correct the distribution of correlations already corrected for sampling error. The correction factor for measurement error is the square root of the reliability.

Typically, the correction factor in a primary study for range restriction on a variable is derived from the ratio of its standard deviation to that in a reference study (Hunter and Schmidt 1990: 125–132). Hunter and Schmidt argue that correlations are directly comparable across studies only if those studies are derived from populations with the same standard deviation on the independent variable. Hence, this correction projects all correlations onto the same reference standard deviation. A national probability sample of 727 work establishments in the United States was selected as the reference study for measures of horizontal and vertical differentiation, decentralization and formalization (Marsden et al. 1994). For consistency, a US study of manufacturing, service and professional organizations was selected as the referent for task specialization and standardization (Conaty et al. 1983). Another US study

was also used as the referent for role routine measures of task specialization (Inkson et al. 1970b).

Before this ratio could be calculated, standard deviations in studies were corrected, as measures often were not strictly comparable. Preferably, the ratio should reflect the distribution of scores in a study relative to the reference study. However, the size of the standard deviation in studies is also influenced by other measurement features such as the number of items, the number and scoring of alternative responses, and whether total or average item scores are reported. For example, the referent value for the standard deviation on horizontal differentiation is .31 and another study reports a standard deviation of 19.04 (Blau 1973), giving a standard deviation ratio of 61.4. However, the referent study reports the proportion of departments found in an organization from a list of eight departments provided by the researchers, whereas the other study reports the number of departments. Consequently, the standard deviation of 19.04 was divided by the total possible score to also provide a proportion. With this adjustment the standard deviation of 19.04 becomes .233, giving a ratio of .751. Thus, each standard deviation was first converted to a proportion before the standard deviation ratio was calculated.

The estimates of the corrected correlations in this meta-analysis are likely to be conservative. No account is taken of the reliability of vertical differentiation, as reliabilities are not reported in primary studies. Thus, corrected correlations with vertical differentiation are underestimated, and variances overestimated, to the extent that measures of vertical differentiation are unreliable. Additionally, estimates of the reliability of other structural variables are based on information available in some, but not all, studies. Correlations with these other variables are also likely to be underestimated and variances overestimated. These inaccuracies will depend on the extent to which the average reliability for each variable used in the meta-analysis exceeds the reliabilities in studies not reporting them.

In the final meta-analysis, correlations are concluded to be positive where the 95% confidence interval of the estimated correlation excludes zero (Gooding and Wagner 1985; Hunter and Schmidt 1990). Hunter and Schmidt (1990) recommend no moderator analysis where sampling error, measurement error and range restriction together account for 75% of the variance observed in correlations. Thus, influences of time on relationships are explored where sampling error, measurement error and range variation explain less than 75% of observed variance.

## Results

The main purpose of this study is to test a model of bureaucratic control (Weber 1946) against a synthesis of empirical findings about relationships among variables of formal structure. The model is assessed by analysing the strength of relationships among structural variables reported in studies of organizations. The analysis also addresses whether the observed pattern of relationships among the variables persists over time. The present results, from

Table 3. Meta-analysis of Relationships among Variables of Formal Structure, Corrected for Sampling Error, Measurement Error and Range Variation <sup>a</sup>

| Relationship <sup>b</sup>              | <i>k</i> | <i>N</i> | Mean <i>r</i> | 95% <i>C.I.</i> |       | Observed variance | Sampling error | Variance explained (%) by |                   |                 | Residual variance % |
|----------------------------------------|----------|----------|---------------|-----------------|-------|-------------------|----------------|---------------------------|-------------------|-----------------|---------------------|
|                                        |          |          |               | Lower           | Upper |                   |                | Sampling error            | Measurement error | Range variation |                     |
| <b>Task specialization with</b>        |          |          |               |                 |       |                   |                |                           |                   |                 |                     |
| Vertical differentiation               | 12       | 1055     | 0.58          | 0.397           | 0.762 | 0.0323            | 0.0065         | 20.0                      |                   | 7.1             | 72.8                |
| Horizontal differentiation             | 15       | 1535     | 0.75          | 0.567           | 0.940 | 0.0394            | 0.0048         | 12.2                      | 4.1               | 6.5             | 77.2                |
| Decentralization                       | 9        | 891      | 0.59          | 0.282           | 0.901 | 0.0311            | 0.0080         | 25.8                      | 22.5              | 6.3             | 45.4                |
| Standardization                        | 12       | 528      | 0.49          | 0.115           | 0.873 | 0.1166            | 0.0181         | 15.5                      | 2.4               | 43.7            | 38.3                |
| Formalization                          | 19       | 1360     | 0.42          | 0.132           | 0.710 | 0.0501            | 0.0116         | 23.2                      | 4.0               | 43.4            | 29.3                |
| <b>Vertical differentiation with</b>   |          |          |               |                 |       |                   |                |                           |                   |                 |                     |
| Horizontal differentiation             | 22       | 1739     | 0.56          | 0.247           | 0.882 | 0.0432            | 0.0099         | 22.9                      | 0.2               | 11.7            | 65.2                |
| Decentralization                       | 19       | 1833     | 0.51          | 0.159           | 0.861 | 0.0359            | 0.0090         | 25.0                      | 7.7               | 12.8            | 54.4                |
| Standardization                        | 8        | 445      | 0.58          | 0.191           | 0.971 | 0.0275            | 0.0142         | 51.5                      | 12.7              | 19.6            | 16.2                |
| Formalization                          | 19       | 1467     | 0.51          | 0.171           | 0.853 | 0.0286            | 0.0108         | 37.7                      | 1.7               | 17.9            | 42.6                |
| <b>Horizontal differentiation with</b> |          |          |               |                 |       |                   |                |                           |                   |                 |                     |
| Decentralization                       | 26       | 2089     | 0.43          | 0.068           | 0.784 | 0.0482            | 0.0111         | 23.1                      | 3.5               | 6.2             | 67.2                |
| Standardization                        | 13       | 533      | 0.60          | 0.171           | 1.020 | 0.1390            | 0.0185         | 13.3                      | 3.0               | 10.1            | 73.6                |
| Formalization                          | 38       | 3022     | 0.65          | 0.326           | 0.976 | 0.0361            | 0.0093         | 25.9                      | 4.3               | 26.4            | 43.4                |
| <b>Decentralization with</b>           |          |          |               |                 |       |                   |                |                           |                   |                 |                     |
| Standardization                        | 13       | 826      | 0.45          | 0.088           | 0.817 | 0.0364            | 0.0135         | 37.2                      | 7.4               | 56.4            | −1.1                |
| Formalization                          | 32       | 2623     | 0.37          | −0.049          | 0.796 | 0.0403            | 0.0115         | 28.5                      | 4.1               | 25.4            | 42.0                |
| <b>Standardization with</b>            |          |          |               |                 |       |                   |                |                           |                   |                 |                     |
| Formalization                          | 16       | 729      | 0.46          | 0.108           | 0.822 | 0.1498            | 0.0176         | 11.7                      | 2.3               | 6.1             | 79.9                |

<sup>a</sup> For each relationship, the number of correlations is given by *k*, while the number of organizations is given by *N*.

<sup>b</sup> Measurement error is calculated from both variables when available. Range variation is calculated for the independent variable only. Independent variables are identified in the rows without numbers.

a cumulation of empirical research over almost 40 years, substantially support the model. The six structural variables are positively interrelated, with an average correlation of .54. For the pairs of structural variables, on average, half of the variation in correlations between studies is due to artefacts: 25% is due to sampling error, 20% to the range artefact and 5% to the reliability artefact. The remaining inter-study variation may be caused by moderators. Date of the study is examined, but found not to be a moderator.

The sample-size weighted means of the 15 correlations among task specialization, vertical and horizontal differentiation, decentralization, standardization and formalization (Table 3) are consistent with the positive relationships hypothesized among them (hypothesis 1). The correlations vary from .37 to .75, with an average of .54. These correlations are corrected for the effects on variation in correlations over studies of sampling error, range restriction on the independent variable, and measurement error on both variables. Their confidence intervals exclude zero, apart from the correlation of decentralization with formalization ( $-.049 < r = .37 < .796$ ). These estimates are derived from 8 to 38 studies investigating from 445 to 3022 organizations, with an average of 18 studies and 1378 organizations for each correlation.

On average, sampling error accounts for 25% of the variation in correlations, with a maximum of 52% for any correlation (Table 3). Corrections for the effects of range restriction on the independent variable and measurement error on both variables account for a further 20% and 5%, respectively. Further, correcting estimates of the mean correlations for these two statistical artefacts improves the estimates of the correlations corrected only for sampling error by 53%, on average, from .25 to .54. These corrections also widen the confidence intervals of the mean correlations to the same degree. As for the initial estimates, 14 of 15 corrected confidence intervals exclude zero. These results provide substantial support for the positive relationships hypothesized among the six structural variables (hypothesis 1). This pattern of results indicates a core of positive and quite strong relationships among the key attributes in the bureaucratic model that have not arisen by chance.

Sampling error, measurement error and range restriction together account for at least 75% of the variance observed in correlations for two relationships: vertical differentiation and decentralization with standardization. In such cases, Hunter and Schmidt (1990) argue that the unexplained variance may well be due to other statistical artefacts not corrected in the analysis. Thus, for these two relationships, variation in correlations apparent over studies is attributed to statistical artefacts. However, for the other 13 relationships, explained variation is well below the criterion of 75%. Thus, variation in correlations over studies cannot be attributed to statistical artefacts entirely. Variation over studies in these 13 correlations may be a consequence of other factors, such as weakening of relationships over time. The effects of time were explored by correlating observed correlations with their study dates.

Hypothesis 2 predicted a negative relationship between study date and the strength of correlations among the six variables in the bureaucratic model. The associations between study date and observed correlations among the structural variables are negative for 14 of the 15 relationships (Table 4). These

negative correlations with study date range from  $-.11$  to  $-.74$ , with an average of  $-.34$ . Examining standardized residuals from the regressions of strength of correlation on study date identified a single outlier with a standardized residual of  $-3.08$ . The standardized residuals for all other relationships are greater than  $-2.75$ , with an average range of  $-1.92$  to  $1.52$ .

These correlations, however, are not corrected for the effects of the statistical artefacts. Table 4 also shows the correlations between study date and strength of structural relationship after correcting for sampling error, measurement error, and range restriction (see Hunter and Schmidt 1990: 115–117). The correction factor is the square root of the proportion of observed variance remaining after removing variation due to the three statistical artefacts. Correction does not change the signs of the correlations. The 14 negative correlations range from  $-1.0$  to  $-.12$ , with an average of  $-.38$ .

After correcting for the effects of the three statistical artefacts, the corrected confidence interval excludes zero only for the relationship of task specialization with standardization. The outlier analysis suggests that the estimated correlations with study date are not influenced unduly by extreme values. Nevertheless, the correlations are likely to be influenced by outliers as sample sizes are small. Indeed, larger negative correlations occur in smaller samples for the strength of corrected correlations with study date. The smallest

Table 4. Correlations between Strength of Relationship and Study Date<sup>a</sup>

| Relationship                           | <i>Cor</i>                              | 95% C.I. |          | <i>Cor</i>                                          | 95% C.I. |          |
|----------------------------------------|-----------------------------------------|----------|----------|-----------------------------------------------------|----------|----------|
|                                        | ( <i>r</i> , <i>date</i> ) <sup>b</sup> | Lower    | Upper    | ( <i>r<sub>c</sub></i> , <i>date</i> ) <sup>c</sup> | Lower    | Upper    |
| <b>Task specialization with</b>        |                                         |          |          |                                                     |          |          |
| Vertical differentiation               | $-0.48$                                 | $-0.826$ | $0.129$  | $-0.49$                                             | $-0.829$ | $0.122$  |
| Horizontal differentiation             | $-0.56$                                 | $-0.835$ | $-0.071$ | $-0.47$                                             | $-0.791$ | $0.057$  |
| Decentralization                       | $-0.26$                                 | $-0.787$ | $0.490$  | $-0.22$                                             | $-0.771$ | $0.522$  |
| Standardization                        | $-0.54$                                 | $-0.850$ | $0.050$  | $-0.61$                                             | $-0.875$ | $-0.049$ |
| Formalization                          | $-0.21$                                 | $-0.606$ | $0.270$  | $-0.28$                                             | $-0.653$ | $0.197$  |
| <b>Vertical differentiation with</b>   |                                         |          |          |                                                     |          |          |
| Horizontal differentiation             | $-0.26$                                 | $-0.611$ | $0.186$  | $-0.19$                                             | $-0.569$ | $0.247$  |
| Decentralization                       | $-0.19$                                 | $-0.596$ | $0.286$  | $-0.14$                                             | $-0.558$ | $0.336$  |
| Standardization                        | $-0.74$                                 | $-0.949$ | $-0.067$ | $-1.00$                                             | $-1.000$ | $-0.999$ |
| Formalization                          | $-0.47$                                 | $-0.762$ | $-0.021$ | $-0.43$                                             | $-0.740$ | $0.029$  |
| <b>Horizontal differentiation with</b> |                                         |          |          |                                                     |          |          |
| Decentralization                       | $-0.32$                                 | $-0.630$ | $0.076$  | $-0.23$                                             | $-0.564$ | $0.176$  |
| Standardization                        | $-0.28$                                 | $-0.722$ | $0.317$  | $-0.21$                                             | $-0.681$ | $0.388$  |
| Formalization                          | $-0.11$                                 | $-0.414$ | $0.218$  | $-0.10$                                             | $-0.404$ | $0.230$  |
| <b>Decentralization with</b>           |                                         |          |          |                                                     |          |          |
| Standardization                        | $-0.12$                                 | $-0.631$ | $0.459$  | $-0.12$                                             | $-0.631$ | $0.459$  |
| Formalization                          | $0.19$                                  | $-0.167$ | $0.507$  | $0.15$                                              | $-0.212$ | $0.472$  |
| <b>Standardization with</b>            |                                         |          |          |                                                     |          |          |
| Formalization                          | $-0.30$                                 | $-0.693$ | $0.230$  | $-0.24$                                             | $-0.660$ | $0.286$  |

<sup>a</sup> The number of correlations (*k*) and organizations (*N*) is available from Table 3.

<sup>b</sup> The uncorrected correlation is the correlation between reported correlations and dates of primary studies.

<sup>c</sup> The uncorrected correlation divided by the square root of the proportion of observed variance remaining after removing variation due to sampling error, measurement error in both variables, and range variation on the independent variable. Independent variables are identified in the rows without numbers.

samples ( $k < 15$ ) show an average correlation of  $-.56$ , while the largest samples ( $k > 30$ ) show correlations of  $-.10$  and  $.15$ . Further analysis of the smaller samples shows that relationships with study date approach zero when a single study is omitted from each relationship. This also applies to the relationship of task specialization with standardization. Hence, the apparently negative relationship between the strength of the task specialization–standardization correlation and study date seems to be influenced by the small number of studies reporting the relationship.

For the other 14 relationships, statistical artefacts account for more than 75% of the variation in correlations (2) or corrected confidence intervals include zero (12). In sum, the data fail to support the negative relationship between study date and strength of correlation, predicted in hypothesis 2, once their correlations have been corrected for statistical artefacts.

## Discussion

The main purpose of this study is to test a model of bureaucratic control against a synthesis of empirical findings about the strength of relationships among variables of formal structures (Weber 1946). This model of bureaucratic control most often postulates positive relationships among task specialization, vertical and horizontal differentiation, decentralization, standardization and formalization (Child 1972b). Removing the effects of statistical artefacts from the relationships among these core structural variables shows that these relationships are quite strong and generalize over studies conducted since the 1960s. The average correlation is  $.54$ , after correcting for the statistical artefacts of sampling error, measurement error and range restriction on independent variables. Moreover, the 95% confidence interval excludes zero for 14 of the 15 correlations.

The correlation of decentralization with formalization is the single exception to this pattern of positive and strong relationships among structural variables. This is the weakest of all structural relationships and its confidence interval includes zero. However, its confidence interval overlaps substantially with that for the strongest relationship between task specialization and horizontal differentiation. Hence the correlation of decentralization with formalization fits the overall pattern of correlations. The relationships of decentralization with formalization and standardization have been problematic from the beginning of this research tradition. These correlations are weaker in the Aston study (Pugh et al. 1968) than in subsequent replications (Child 1972b; Hinings and Lee 1971). Child (1972b) suggests that the scoring technique for decentralization compresses the range of scores on decentralization as the Aston study contains organizations differing in status. This range restriction produces weaker correlations with decentralization. While status has been rejected as an adequate explanation for these early inconsistencies (Donaldson et al. 1975), inadequate measurement of decentralization remains an unresolved issue (Greenwood and Hinings 1976b; Mansfield 1973).

These concerns with measuring decentralization do not show in the analysis of correlations corrected for sampling error only. The average correlation with decentralization ( $.075 < r = .27 < .443$ ) is less than the average correlation among other variables ( $.253 < r = .39 < .507$ ), but their confidence intervals overlap substantially. Apparently, these issues do not substantially affect estimated correlations with decentralization. However, their impact on variation in observed correlations is clearly apparent. The average proportion of variance in observed correlations attributed to range variation on decentralization (56.6%) exceeds that attributed to range variation on independent variables in all other correlations (19.3%). Additionally, the average proportion of variance explained by measurement error on decentralization (8.1%) exceeds that on all other variables (2.3%). However, sampling error, on average, explains similar proportions of variance in observed correlations with (27.9%) and without (23.4%) decentralization. The impact of range variation and measurement error on correlations with decentralization requires further examination. Meanwhile, the positive relationship hypothesized between decentralization and formalization is tentatively accepted given its moderately positive correlation, but subject to satisfactory resolution of these issues.

This analysis strengthens the conclusion that the strength of relationships in the model of bureaucratic control has persisted over time. Statistical artefacts explain more than 75% of the inter-study variation for two relationships. The confidence intervals include zero for 12 of the 13 correlations between strength of relationship among the six structural variables and study date. The confidence interval that does exclude zero appears to be influenced by the smaller number of studies investigating the relationship. Thus, the generally negative correlations between study date and strength of corrected correlations among structural variables do not support arguments about new structural forms heralding the demise of bureaucratic control. However, whether newer organizational forms such as flattened hierarchies, flexible work arrangements and distributed activities alter structural relationships remains unclear. The present analysis includes only three studies that were conducted since 1988. Nevertheless, the results of testing hypotheses about the persistence of bureaucracy over time are consistent with Smith's conclusions; in particular, that 'findings about organizational redesign do not support the claim for genuine decentralization and empowerment that has been so pervasive in the call for new ways of working' (Smith 1997: 320).

The estimates of fully corrected correlations depend on the statistical status of the variables in each relationship. Corrections for range restriction must specify the independent variable. The meta-analytical procedures developed by Hunter and Schmidt (1990) do not provide for simultaneously correcting for range restriction on both variables. The statistical status of variables in each relationship is determined from the theoretical precedence assumed among variables in the present analysis. This begins with task specialization, progressing, in order, to vertical differentiation, horizontal differentiation, decentralization, standardization and formalization. Each variable is treated as an independent variable in relationships with subsequent variables. Estimates of corrected correlations and variances will differ if the variables

have a different statistical status. For example, the average corrected correlation is .51 for a model in which the dependent and independent variables are reversed in each relationship. Estimated correlations with horizontal differentiation and formalization increase by about .05, while all others decrease by about .05. Changing the statistical status of each variable in a relationship also affects estimates of variances and their attribution to different artefacts. However, reversing the statistical status of the components in each relationship requires theoretical justification.

On average, sampling error, measurement error and range restriction explain 50% of the variation in correlations among structural variables. Thus, exploring other sources of systematic variation may clarify the model of bureaucratic control further. These sources of systematic variation are likely to include other statistical and some measurement artefacts (Hunter and Schmidt 1990). For example, reviewers explaining variation in findings in structural contingency research consistently identify issues such as definitional and measurement ambiguity, appropriate levels of analysis and the impact of sampling strategies (e.g. Drazin and Van De Ven 1985; Ford and Slocum 1977; Starbuck 1981; Walton 1980, 1981). Once these sources of systematic variation in correlations have been removed, then claims about the persistence of the model of bureaucratic control can be assessed more adequately.

### Limitations

Even though this study cumulates findings from almost four decades of empirical research, several issues suggest caution when interpreting these cumulative findings. First, the present conclusions about the strength of relationships proposed in the model are limited by choices of constructs made in primary studies. All 15 relationships were investigated in only six studies, with most studies reporting relationships among three or fewer structural variables. As a result, conclusions about an overall pattern of structural relationships in organizations rely on combining studies of subsets of relationships, rather than the full network of associations proposed in the model. While this is one of the strengths of meta-analysis, more reliable estimates might have been obtained by including unpublished studies most likely reporting smaller or contrary effects. However, excluding unpublished research does not seriously limit interpretations of the findings as the 'file drawer problem' typically does not produce biases in estimating correlations (Hunter and Schmidt 1990; Rosenthal 1984).

Second, the relatively small number of studies might suggest limits to the strength of conclusions drawn about the model of bureaucratic control. This is not the case as estimates of relationships between pairs of structural variables are derived, on average, from 18 studies investigating 1378 organizations. Moreover, 25 missing or additional studies averaging null results are needed to invalidate the results reported here. This number of studies is needed to reduce the average effect size ( $r = .54$ ) to .001 below the critical value of  $r$  (.229) for  $p = .05$  in average-sized samples ( $n = 74$ ). The number of missing, or additional studies, averaging null results needed to reduce the

size of each correlation to .001 below the critical value of  $r$  for  $p = .05$  in its average-sized sample ranges from 8 for task specialization and standardization to 75 for horizontal differentiation and formalization. The data on the former relationship were collected in 12 studies over 15 years. Invalidating these results at this rate would take another 10 years and null relationships must be reported in each study. Overall, data were collected in 64 studies over 31 years. Invalidating the overall results at this rate would take another 12 years of research, reporting entirely null results

### **The Model of Bureaucratic Control and Modern Organization Theory**

Weber's (1946) views, early in the 20th century, about the inevitability of bureaucratization have been seriously questioned later in the century. Variation in empirical findings has generated many criticisms of this area of research on organizations. Some researchers advocate alternatives to the model of bureaucratic control, but others claim that it is moribund (Pfeffer 1997; but see Donaldson 1996, 2001 for rebuttals). The present examination of four decades of research on this model shows that 50% of the variation in empirical findings can be attributed to statistical artefacts. Consequently, many of the criticisms appear unfounded as most of the variation is illusory. This variation reflects methodological shortcomings rather than substantive or theoretical issues in the research realm.

Such criticisms stimulate the view that the model of bureaucratic control has little relevance, if any, for modern organization theory (e.g. Child and McGrath 2001). A more optimistic view provided by the current study is that the very model of bureaucratic control, abhorred by many, facilitates opportunities for developing new organizational forms. Many administrative and operational innovations have emerged over the past 40 years, including flatter hierarchies, temporary structures, flexible work systems and networked activities. Such innovations may increase work intensification, opportunities, involvement and empowerment for employees to varying degrees. However, these innovations coexist with a model of bureaucratic control exhibiting moderately strong relationships among its core variables. Hence, these outcomes occur within constrained, decentred and hierarchical systems of control while relying on new mechanisms for monitoring and evaluating conduct and outcomes (Smith 1997). These kinds of innovations may largely enhance the adaptability of the model of bureaucratic control, rather than herald its impending demise (Gazell and Pugh 1990).

The model of bureaucratic control accommodates such new forms precisely because reducing divisions of labour and reorganizing workflows do not alter overall control of activities significantly. Such reductions and reorganizations also reduce levels of procedural standardization and documentation while centralizing decision-making in organizations. Also, the moderately strong relationships among attributes of the model provide sufficient flexibility for changes to some components without changing others markedly. For example, Bigley and Roberts (2001) clearly demonstrate how basic bureaucratic elements such as roles, routines, procedures and reporting relationships

are important sources of flexibility in organizational responses to increasingly demanding environments. This flexibility in the model of bureaucratic control maintains the integrity of the overall network of attributes, while supporting the control aspirations of senior management through the redesign process.

## Conclusions

This study reviews theorizing about relationships among key attributes in a model of bureaucratic control and explores its persistence over time. Prior empirical research is used in assessing these relationships and whether variations occur over time. The findings demonstrate the general validity of the model of bureaucratic control. Moreover, the flexibility afforded by moderately strong relationships in the model implies considerable potential for adapting the model in modern organizational settings. Whether such adaptations represent new organizational designs remains debatable as the model of bureaucratic control continues its dominance of modes of organizational design. These findings are consistent with Weber's vision

'of the slow but inexorable replacement of traditional with rational-legal structures, punctuated by radical organizations inspired by saints and demagogues; these innovations in turn are caught up in the fabric of reinterpreted traditions and spawn new rules and regulations.' (Scott 1981: 33–34)

## Appendix 1: Studies Included in the Meta-analysis

| Author(s)                    | N   | Rs <sup>a</sup> | Date <sup>b</sup> | Type of organization                               |
|------------------------------|-----|-----------------|-------------------|----------------------------------------------------|
| Aiken and Bacharach (1978)   | 44  | 3               | 1970              | City administrations                               |
| Armandi and Mills (1982)     | 104 | 6               | 1976              | Savings and loan associations                      |
| Atwater (1995)               | 45  | 3               |                   | Manufacturing and service organizations            |
| Azumi and Mcmillan (1981)    | 50  | 3               | 1972              | Manufacturing organizations                        |
| Badran and Hinings (1981)    | 31  | 3               | 1977              | Mixed public sector enterprises                    |
| Beyer and Trice (1979)       | 71  | 5               | 1974              | Federal government installations                   |
| Blau (1973)                  | 115 | 3               | 1968              | Universities and colleges                          |
| Blau and Mckinley (1979)     | 77  | 3               | 1974              | Architectural firms                                |
| Blau and Schoenherr (1971)   | 416 | 6               | 1965              | Finance departments in state and local governments |
| Blau and Schoenherr (1971)   | 51  | 10              | 1966              | Government employment security agencies            |
| Bresser (1984)               | 35  | 6               | 1978              | University departments                             |
| Child (1972)                 | 82  | 15              | 1971              | Manufacturing and service organizations            |
| Child and Kieser (1979)      | 47  | 4               | 1969              | Manufacturing firms in different industries        |
| Conaty et al. (1983)         | 65  | 15              |                   | Manufacturing and service organizations            |
| Conaty et al. (1983)         | 64  | 15              |                   | Manufacturing and service organizations            |
| Dastmalchian and Boag (1990) | 43  | 3               | 1985              | Marketing departments                              |
| Dewar and Werbel (1979)      | 52  | 1               | 1978              | Departments in consumer agencies                   |
| Donaldson and Warner (1974)  | 7   | 10              | 1971              | Occupational interest associations                 |
| Ford (1979)                  | 68  | 10              | 1975              | Businesses in different industries                 |
| Geeraerts (1984)             | 126 | 3               | 1981              | Manufacturing and service organizations            |
| Germain and Droge (1997)     | 199 | 1               |                   | Manufacturing organizations                        |
| Glisson (1978)               | 30  | 1               |                   | Social services organizations                      |
| Goldman (1973)               | 124 | 1               | 1968              | Departmental stores                                |

*Continued*

*Appendix 1 Continued*

| Author(s)                         | N   | Rs <sup>a</sup> | Date <sup>b</sup> | Type of organization                         |
|-----------------------------------|-----|-----------------|-------------------|----------------------------------------------|
| Greenwood and Hinings (1976a)     | 84  | 6               | 1973              | Local government agencies                    |
| Grinyer and Yasai-Ardekani (1980) | 45  | 6               | 1976              | Electrical engineering companies             |
| Hall (1963)                       | 10  | 1               | 1961              | Manufacturing and service organizations      |
| Heydebrand (1973)                 | 122 | 1               | 1964              | Private welfare agencies                     |
| Hinings and Lee (1971)            | 9   | 15              | 1967              | Engineering and electrical goods firms       |
| Hinings et al. (1976)             | 9   | 6               | 1972              | Churches                                     |
| Holdaway et al. (1975)            | 23  | 6               | 1970              | Colleges and technological institutes        |
| Hull and Collins (1987)           | 110 | 6               | 1973              | Manufacturing plants in different industries |
| Inkson et al. (1970a)             | 40  | 1               | 1968              | Manufacturing and service organizations      |
| Inkson et al. (1970b)             | 25  | 1               | 1968              | Manufacturing organizations                  |
| Inkson et al. (1970b)             | 21  | 2               | 1968              | Manufacturing organizations                  |
| Jennings and Seaman (1994)        | 99  | 1               | 1983              | Savings and loan associations                |
| Kazanjian and Drazin (1990)       | 105 | 3               |                   | New ventures in high technology industries   |
| Khandwalla (1974)                 | 79  | 1               | 1970              | Manufacturing organizations                  |
| Khandwalla (1977)                 | 103 | 1               | 1973              | Manufacturing and service organizations      |
| Lincoln et al. (1978)             | 54  | 6               |                   | Japanese manufacturing and service firms     |
| McMillan et al. (1973)            | 24  | 1               | 1969              | Manufacturing firms in different industries  |
| Mahmoudi and Miller (1985)        | 10  | 1               |                   | Hospitals                                    |
| Marsden et al. (1994)             | 688 | 3               | 1991              | Manufacturing and service organizations      |
| Marsh and Mannari (1981)          | 50  | 6               | 1976              | Manufacturing firms in different industries  |
| Meyer and Brown (1977)            | 215 | 2               | 1966              | Finance departments in local governments     |
| Mileti et al. (1977)              | 28  | 1               |                   | Functions in state and federal agencies      |
| Miller (1987)                     | 97  | 3               | 1984              | Manufacturing and service firms              |
| Moch (1976)                       | 450 | 3               |                   | Hospitals                                    |
| Montanari and Freedman (1981)     | 220 | 3               |                   | Manufacturing and service firms              |
| Palumbo (1969)                    | 14  | 3               |                   | Public health departments                    |
| Paulson (1974)                    | 138 | 1               |                   | Health and welfare agencies                  |
| Payne and Mansfield (1973)        | 14  | 1               | 1970              | Manufacturing and service firms              |
| Pennings (1973)                   | 10  | 2               | 1970              | Manufacturing and service firms              |
| Pugh et al. (1968)                | 46  | 15              | 1963              | Manufacturing and service firms              |
| Reimann (1973)                    | 19  | 6               | 1971              | Manufacturing firms                          |
| Rousseau (1978)                   | 19  | 3               |                   | Departments in two firms                     |
| Routamaa (1985)                   | 122 | 6               | 1978              | Manufacturing firms in clothing industries   |
| Sathe (1978)                      | 22  | 2               |                   | Departments in insurance company             |
| Shrader et al. (1989)             | 36  | 1               |                   | Private, not-for-profit agencies             |
| Tayeb (1987)                      | 7   | 3               | 1982              | Manufacturing firms in different industries  |
| Tayeb (1987)                      | 7   | 3               | 1983              | Manufacturing firms in different industries  |
| Van De Ven and Ferry (1980)       | 29  | 3               | 1975              | Local government employment agencies         |
| Wally and Baum (1994)             | 151 | 1               |                   | Manufacturing firms in different industries  |
| Wong and Birnbaum-More (1994)     | 39  | 6               | 1983              | Multinational commercial banks               |
| Zeffane (1989)                    | 149 | 3               |                   | Manufacturing and service firms              |

<sup>a</sup> The number of relationships from each study included in the meta-analysis.

<sup>b</sup> The year of data collection.

## Appendix 2: Procedures for Combining Multiple Indicators of a Structural Variable within a Study

Two procedures are used to estimate correlations among multiple indicators of the same structural variable (Table 5). The first procedure calculated the correlation between a linear composite of multiple indicators of a structural variable and another variable (Hunter and Schmidt (1990: 457). This was applied to 11 studies where correlations among multiple indicators are reported. For example, correlations of decentralization with functional specialization in engineering, manufacturing and marketing were combined into an overall

Table 5: Composite Measures in Estimating Within-Study Correlations

| Study                       | Measures in composite                                                                                                                                                                                         | Structural variable        |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|
| Armandi and Mills (1982)    | Centralization of exceptional decisions (reversed)<br>Centralization of routine decisions (reversed)                                                                                                          | Decentralization           |
| Beyer and Trice (1979)      | Written rules<br>Rule specificity                                                                                                                                                                             | Formalization              |
| Blau (1973)                 | Administration's influence in appointments (reversed)<br>Senior faculty's appointment authority (reversed)<br>President's influence in appointments (reversed)<br>President's authority over funds (reversed) | Decentralization           |
| Blau and Schoenherr (1971)  | Delegation personnel<br>Delegation budget                                                                                                                                                                     | Decentralization           |
| Child and Kieser (1979)     | Role definition                                                                                                                                                                                               | Formalization              |
| Dewar and Werbel (1979)     | Formalization<br>Surveillance enforcement                                                                                                                                                                     | Standardization            |
| Hall (1963)                 | Rules<br>Procedures                                                                                                                                                                                           | Standardization            |
| Hull and Collins (1987)     | Decentralization of operating decisions<br>Decentralization of strategic decisions                                                                                                                            | Decentralization           |
| Inkson et al. (1970b)       | Role formalization                                                                                                                                                                                            | Formalization              |
| Kazanjian and Drazin (1990) | Functional specialization — engineering<br>Functional specialization — manufacturing<br>Functional specialization — marketing                                                                                 | Horizontal differentiation |
| Meyer and Brown (1977)      | Delegation — promotion<br>Delegation — influence                                                                                                                                                              | Decentralization           |
| Palumbo (1969)              | Centralization — perception (reversed)<br>Centralization — supervisors checks (reversed)                                                                                                                      | Decentralization           |
| Pennings (1973)             | Rule observation<br>Job specificity                                                                                                                                                                           | Standardization            |

estimate of the association between functional specialization and decentralization in a study by Kazanjian and Drazin (1990). The second procedure calculated the average of the correlations between multiple indicators of a structural variable and another variable (Hunter and Schmidt (1990: 453). This was applied to two studies not reporting the correlations among those multiple indicators (Child and Kieser 1979; Meyer and Brown (1977).

For Blau's (1973) study of educational institutions, the composite excluded centralization of educational matters (reversed) and centralized salary influence (reversed) due to their different patterns of correlations with other measures of structure. This indicated that these measures may not assess the same underlying structural variable as the measures included in the composite, in the sense of reliability theory. Decentralization influence and delegation to local office managers in Blau and Schoenherr's (1971) study were also excluded for the same reason.

Two measures, rules and procedures, are treated as indicators of standardization, and their linear composite was correlated with division of labour in one study (Hall 1963). Job codification, rule observation (Hage and Aiken 1967) and job specificity (Aiken and Hage 1968) were among several measures of formalization in a study of alternative measures of formal structures (Pennings 1973). Correlations with job codification were discarded because it does not unambiguously measure formalization (Dewar et al. 1980), as initially proposed by Hage and Aiken (1967). They suggest that it may measure job autonomy and possibly decentralization. The linear composite of rule observation and job specificity was treated as a measure of standardization as these focus on conforming to standards and procedural definition (Pennings (1973). This composite was used in estimating correlations of standardization with horizontal differentiation and formalization.

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**References**

- Aiken, Michael, and Samuel B. Bacharach  
1978 'The urban system, politics, and bureaucratic structures: A comparative analysis of 44 local governments in Belgium' in *Organization and environment: Theory, issues, and reality*. Lucien Karpik (ed.). London: Sage.
- Aiken, Michael, and Jerald T. Hage  
1968 'Organizational interdependence and intra-organizational structure'. *American Sociological Review* 33: 912–930.
- Armandi, Barry R., and Edgar W. Mills Jr  
1982 'Organizational size, structure, and efficiency: A test of a Blau-Hage model'. *American Journal of Economics and Sociology* 41/1: 43–60.
- Ashmos, Donde P., Dennis Duchon, Frances E. Hauge, and Reuben R. McDaniel, Jr  
1996 'Internal complexity and environmental sensitivity in hospitals'. *Hospital & Health Services Administration* 41/4: 535–555.
- Atwater, Leanne E.  
1995 'The relationship between supervisory power and organizational characteristics'. *Group and Organization Management* 20/4: 460–485.
- Azumi, Koya, and Charles J. McMillan  
1981 'Management strategy and organization structure: A Japanese comparative study' in *Organisation and nation: The Aston program IV*. David J. Hickson and Charles J. McMillan (eds), 115–172. Westmead: Gower.
- Badran, Mohamed, and C. R. Hinings  
1981 'Strategies of administrative control and contextual constraints in a less-developed country: The case of Egyptian public enterprise'. *Organization Studies* 2: 3–21.
- Barley, Stephen R.  
1986 'Technology as occasion for structuring: Evidence from observations of CT scanners and the social order of radiology departments'. *Administrative Science Quarterly* 31/1: 78–108.
- Beyer, Janice M., and Harrison M. Trice  
1979 'A reexamination of the relation between size and various components of organizational complexity'. *Administrative Science Quarterly* 24/1: 48–64.
- Bigley, Gregory A., and Karlene H. Roberts  
2001 'The incident command system: High-reliability organizing for complex and volatile task environments'. *Academy of Management Journal* 44/6: 1281–1299.
- Birnbaum, Phillip H., and Gilbert Y. Y. Wong  
1985 'Organisational structure of multinational banks in Hong Kong from a culture-free perspective'. *Administrative Science Quarterly* 30/2: 262–277.
- Blau, Judith R., and William McKinley  
1979 'Ideas, complexity, and innovation'. *Administrative Science Quarterly* 24: 202–219.
- Blau, Peter M.  
1968 'The hierarchy of authority in organizations'. *American Journal of Sociology* 73: 453–467.
- Blau, Peter M.  
1970 'A formal theory of differentiation in organizations'. *American Sociological Review* 35/2: 201–218.
- Blau, Peter M.  
1973 *The organization of academic work*. New York: Wiley.
- Blau, Peter M.  
1974 *On the nature of organizations*. New York: Wiley.

- Blau, Peter M., Celia McHugh Falbe, William McKinley, and K. Tracy Phelps  
1976 'Technology and organization in manufacturing'. *Administrative Science Quarterly* 21: 20–40.
- Blau, Peter M., and Richard A. Schoenherr  
1971 *The structure of organizations*. New York: Basic Books.
- Blau, Peter M., and W. Richard Scott  
1962 *Formal organizations: A comparative approach*. San Francisco, CA: Chandler Publishing Company.
- Bresser, Rudi K.  
1984 'Structural determinants of university departments and their context: The case of West Germany'. *Organization Studies* 5/2: 119–146.
- Carter, Nancy M., and Thomas L. Keon  
1986 'The rise and fall of the division of labour, the past 25 years'. *Organization Studies* 7/1: 57–74.
- Carter, Nancy M., and Thomas L. Keon  
1989 'Specialization as a multidimensional construct'. *Journal of Management Studies* 26/1: 11–28.
- Child, John  
1972a 'Organizational structure, environment and performance: The role of strategic choice'. *Sociology* 6: 1–22.
- Child, John  
1972b 'Organizational structure and strategies of control: A replication of the Aston study'. *Administrative Science Quarterly* 17: 163–177.
- Child, John, and Alfred Kieser  
1979 'Organizational and managerial roles in British and West German companies: An examination of the culture-free thesis' in *Organisation and nation: The Aston program IV*. David J. Hickson and Charles J. McMillan (eds). Westmead: Gower.
- Child, John, and Rita Gunther McGrath  
2001 'Organizations unfettered: Organizational form in an information-intensive economy'. *Academy of Management Journal* 44/6: 1135–1148.
- Clegg, Stewart R., and Cynthia Hardy  
1996 'Introduction: Organizations, organization, and organizing' in *Handbook of organization studies*. Stewart R. Clegg, Cynthia Hardy and Walter R. Nord (eds), 1–28. London: Sage.
- Conaty, Joseph C., Hoda Mahmoudi, and George A. Miller  
1983 'Social structure and bureaucracy: A comparison of organizations in the United States and prerevolutionary Iran'. *Organization Studies* 4/2: 105–128.
- Crown, Deborah F.  
2000 'Building a multidimensional, context-relevant categorization heuristic for organizational work teams: The tos-tab typology' in *Research in personnel and human resources management*, Vol. 18. Gerald R. Ferris (ed.), 93–136. Greenwich, CT: JAI Press.
- Damanpour, Fariborz  
1992 'Organization size and innovation'. *Organization Studies* 13/3: 375–402.
- Dastmalchian, Ali, and David A. Boag  
1990 'Environmental dependence and departmental structure: Case of the marketing function'. *Human Relations* 43/12: 1257–1276.
- Dewar, Robert D., and James Werbel  
1979 'Universalistic and contingency predictions of employee satisfaction and conflict'. *Administrative Science Quarterly* 24: 426–448.
- Dewar, Robert D., David A. Whetten, and David Boje  
1980 'An examination of the validity and reliability of the Aiken and Hage scales of centralization, formalization, and task routineness'. *Administrative Science Quarterly* 25: 120–128.
- Dewar, Robert, and Jerald T. Hage  
1978 'Size, technology, complexity, and structural differentiation: Toward a theoretical synthesis'. *Administrative Science Quarterly* 23: 111–136.

- Donaldson, Lex  
1985 *In defence of organization theory: A reply to the critics*. Cambridge: Cambridge University Press.
- Donaldson, Lex  
1986 'Size and bureaucracy in East and West: A preliminary meta analysis' in *The enterprise and management in East Asia*. Stewart R Clegg, Dexter Dunphy, and S. G. Redding (eds). Hong Kong: University of Hong Kong Press.
- Donaldson, Lex  
1995 *American anti-management theories of organization*. Cambridge: Cambridge University Press.
- Donaldson, Lex  
1996 *For positivist organization theory: Proving the hard core*. London: Sage.
- Donaldson, Lex  
1998 'The myth of paradigm incommensurability in management studies: Comments by an integrationist'. *Organization* 5/2: 267–272.
- Donaldson, Lex  
2001 *The contingency theory of organizations*. Thousand Oaks, CA: Sage.
- Donaldson, Lex, and Malcolm Warner  
1974 'Structure of organizations in occupational interest associations'. *Human Relations* 27/8: 721–738.
- Donaldson, Lex, John Child, and Howard Aldrich  
1975 'The Aston findings on centralization: Further discussion'. *Administrative Science Quarterly* 20: 453–460.
- Dornbusch, Sanford M., Kristan L. Glasgow, and I. Chun Lin  
1996 'The social structure of schooling'. *Annual Review of Psychology* 47: 401–429.
- Drazin, Robert, and Andrew H. van de Ven  
1985 'Alternative forms of fit in contingency theory'. *Administrative Science Quarterly* 30: 514–539.
- Droge, Cornelia, and Richard Germain  
1998 'The just-in-time inventory effects: Does it hold under different contextual, environmental, and organizational conditions'. *Journal of Business Logistics* 19/2: 53–71.
- Ford, Jeffrey D.  
1979 'Institutional versus questionnaire measures of organizational structure: A reexamination'. *Academy of Management Journal* 22/3: 601–610.
- Ford, Jeffrey D., and John W. Slocum Jr  
1977 'Size, technology, environment and the structure of organizations'. *Academy of Management Review* 2: 561–575.
- Galunic, D. Charles, and Kathleen M. Eisenhardt  
1994 'Renewing the strategy-structure-performance paradigm' in *Research in organizational behavior*, Vol. 16. Larry L. Cummings and Barry M. Staw (eds), 215–255. Greenwich, CT: JAI Press.
- Gazell, James A., and Darrell L. Pugh  
1990 'Administrative theory and large organizations of the future: Whither bureaucracy?' *International Journal of Public Administration* 13/6: 827–858.
- Geeraerts, Guy  
1984 'The effect of ownership on the organization structure of small firms'. *Administrative Science Quarterly* 29: 232–237.
- Germain, Richard, and Cornelia Droge  
1997 'An empirical study of the impact of just-in-time task scope versus just-in-time workflow integration on organizational design'. *Decision Sciences* 28/3: 615–635.
- Ghoshal, S., and D. E. Westney, editors  
1993 *Organizational theory and the multinational corporation*. New York: St Martin's Press.
- Glisson, Charles A.  
1978 'Dependence of technological routinization on structural variables in human service organizations'. *Administrative Science Quarterly* 23: 383–395.

- Glisson, Charles A., and Patricia Yancey Martin  
1980 'Productivity and efficiency in human service organizations as related to structure, size, and age'. *Academy of Management Journal* 23/1: 21–37.
- Goldman, Paul  
1973 'Size and differentiation in organizations: A test of a theory'. *Pacific Sociological Review* 16/1: 89–105.
- Gooding, Richard Z., and John A. Wagner  
1985 'A meta-analytical review of the relationship between size and performance: The productivity and efficiency of organizations and their subunits'. *Administrative Science Quarterly* 30: 462–481.
- Goodman, Paul S., Elizabeth Ravlin, and Marshall Schminke  
1987 'Understanding groups in organizations' in *Research in organizational behavior*, Vol. 9. Larry L. Cummings and Barry M. Staw (eds), 121–173. Greenwich, CT: JAI Press.
- Gouldner, Alvin  
1948 'Discussion'. *American Sociological Review* 13/4: 396.
- Gouldner, Alvin W  
1955 *Patterns of industrial bureaucracy*. London: Routledge.
- Greenwood, R., and C. R. Hinings  
1976a 'Contingency theories and public bureaucracies' in *Organisation structure: Extensions and replications (The Aston programme II)*. D. S. Pugh and C. R. Hinings (eds), 87–101. Westmead: Saxon House.
- Greenwood, Roystan, and C. R. Hinings  
1976b 'Centralization revisited'. *Administrative Science Quarterly* 21: 151–155.
- Gresov, Christopher  
1989 'Exploring fit and misfit with multiple contingencies'. *Administrative Science Quarterly* 34: 431–453.
- Gresov, Christopher  
1990 'Effects of dependence and tasks on unit design and efficiency'. *Organization Studies* 11/4: 503–529.
- Grinyer, Peter H., and Masoud Yasai-Ardekani  
1980 'Dimensions of organizational structure: A critical replication'. *Academy of Management Journal* 23/3: 405–421.
- Hage, Jerald T.  
1965 'An axiomatic theory of organizations'. *Administrative Science Quarterly* 10: 289–320.
- Hage, Jerald T.  
1999 'Organizational innovation and organizational change' in *Annual Review of Sociology*, Vol. 25. 597–622. Palo Alto, CA: Annual Reviews Inc.
- Hage, Jerald T., and Michael Aiken  
1967 'Relationship of centralization to other structural properties'. *Administrative Science Quarterly* 12: 72–92.
- Hall, Richard H.  
1963 'The concept of bureaucracy: An empirical assessment'. *American Journal of Sociology* 69: 32–40.
- Hall, Richard H.  
1967 'Some organizational considerations in the professional-organizational relationship'. *Administrative Science Quarterly* 12: 462–477.
- Hall, Richard H., J. Eugene Hass, and Norman J. Johnson  
1967 'An examination of the Blau-Scott and Etzioni typologies'. *Administrative Science Quarterly* 12: 118–139.
- Heydebrand, Wolf V.  
1973 'The study of organizations' in *Comparative organizations: The results of empirical research*. Wolf V. Heydebrand (ed.), 31–56. Englewood Cliffs, NJ: Prentice Hall.

- Heydebrand, Wolf V., and James J. Noell  
1973 'Task structure and innovation in professional organizations' in *Comparative organizations: The results of empirical research*. Wolf V. Heydebrand (ed.), 294–322. Englewood Cliffs, NJ: Prentice Hall.
- Hinings, C. R., and Gloria L. Lee  
1971 'Dimensions of organization structure and their context: A replication'. *Sociology* 5/1: 83–93.
- Hinings, C. R., Stewart Ranson, and Alan Bryman  
1976 'Churches as organizations: Structure and context' in *Organisation structure: Extensions and replications*. Derek S. Pugh and C. R. Hinings (eds), 102–115.
- Holdaway, Edward A., John F. Newberry, David J. Hickson, and Peter R. Heron  
1975 'Dimensions of organization structure in complex societies: The educational sector'. *Administrative Science Quarterly* 20: 37–58.
- House, Robert, Denise M. Rousseau, and Melissa Thomas-Hunt  
1995 'The meso paradigm: A framework for the integration of micro and macro organizational behavior' in *Research in Organizational Behavior*, Vol. 17. Larry L. Cummings and Barry M. Staw (eds), 71–114. Greenwich, CT: JAI Press.
- Hull, Frank M., and Paul D. Collins  
1987 'High technology batch production systems: Woodward's missing type'. *Academy of Management Journal* 30/4: 786–797.
- Hunter, John E., and Frank L. Schmidt  
1990 *Methods of meta-analysis*. Newbury Park, CA: Sage.
- Indik, B. P.  
1968 'The scope of the problem and some suggestions toward a solution' in *People, groups, and organizations*. B. P. Indik and F. K. Berrien (eds). New York: Teachers College Press.
- Inkson, J. H. Kerr, Derek S. Pugh, and David J. Hickson  
1970a 'Organization context and structure: An abbreviated replication'. *Administrative Science Quarterly* 15: 318–329.
- Inkson, J. H. Kerr, John P. Schwitter, Diana C. Pheysey, and David J. Hickson  
1970b 'A comparison of organization structure and managerial roles: Ohio, USA and the Midlands, England'. *Journal of Management Studies* 7: 347–363.
- James, Lawrence R., and Alan P. Jones  
1976 'Organization structure: A review of structural dimensions and their conceptual relationships with individual attitudes and behavior'. *Organizational Behaviour and Human Performance* 16: 74–113.
- Jennings, Daniel F., and Samuel L. Seaman  
1994 'High and low levels of organizational adaptation: An empirical analysis of strategy, structure, and performance'. *Strategic Management Journal* 15/6: 459–475.
- Kalleberg, Arne L., David Knoke, Peter V. Marsden, and Joe L. Spaeth  
1996 *Organizations in America: Analyzing their structures and human resource practices*. Thousand Oaks, CA: Sage.
- Kazanjian, Robert K., and Robert Drazin  
1990 'A state-contingent model of design and growth for technology based new ventures'. *Journal of Business Venturing* 5/3: 137–150.
- Ketchen Jr, David J., James G. Combs, Craig J. Russell, et al.  
1997 'Organizational configurations and performance: A meta-analysis'. *Academy of Management Journal* 40/1: 223–240.
- Khandwalla, Pradip N.  
1974 'Mass output orientation of operations technology and organization structure'. *Administrative Science Quarterly* 19: 74–97.
- Khandwalla, Pradip N.  
1977 *The design of organizations*. New York: Harcourt Brace Jovanovich.

- Kimberly, John R.  
1976 'Organizational size and the structuralist perspective: A review, critique and proposal'. *Administrative Science Quarterly* 21: 571–597.
- Kmetz, John L.  
1978 'A critique of the Aston studies and results with a new measure of technology'. *Organization & Administrative Science* 8/4: 123–144.
- Kostecki, Marian J., and Krzysztof Mrela  
1983 'Research note: The incompatibility of comparisons: Comparative studies of organizations and the cumulation of scientific knowledge'. *Organization Studies* 4/1: 73–88.
- Lawrence, Paul R., and Jay W. Lorsch  
1967 *Organization and environment: Managing differentiation and integration*. Boston, MA: Division of Research, Graduate School of Business Administration, Harvard University.
- Lee, Raymond T., and Blake E. Ashforth  
1991 'Work-unit structure and process and job-related stressors as predictors of managerial burnout'. *Journal of Applied Social Psychology* 21: 1831–1847.
- Lincoln, James R., Mitsuyo Hanada, and Kerry McBride  
1986 'Organizational structure in Japanese and US manufacturing'. *Administrative Science Quarterly* 31/3: 338–364.
- Lincoln, James R., Jon Olson, and Mitsuyo Hanada  
1978 'Cultural effects on organization structure: The case of Japanese firms in the United States'. *American Sociological Review* 43: 829–847.
- McMillan, Charles J., David J. Hickson, Christopher R. Hinings, and Rodney E. Schneck  
1973 'The structure of work organizations across societies'. *Academy of Management Journal* 16: 555–569.
- Mahmoudi, Hoda, and George A. Miller  
1985 'A causal model of hospital structure'. *Group and Organisation Studies* 10(2): 209–223.
- Mansfield, Roger  
1973 'Bureaucracy and centralization: An examination of organizational structure'. *Administrative Science Quarterly* 18: 477–488.
- March, James G., and Herbert A. Simon  
1958 *Organizations*. New York: Wiley.
- Marsden, Peter V., Cynthia R. Cook, and Arne L. Kalleberg  
1994 'Organizational structures'. *American Behavioral Scientist* 37/7: 911–929.
- Marsh, Robert M., and Hiroshi Mannari  
1981 'Technology and size as determinants of the organizational structures of Japanese factories'. *Administrative Science Quarterly* 26: 33–57.
- Martin, Patricia Yancey, and Charles Glisson  
1989 'Perceived structure: Welfare organizations in three societal cultures'. *Organization Studies* 10/3: 353–380.
- Martinez, Jon I., and J. Carlos Jarillo  
1989 'The evolution of research on coordination mechanisms in multinational corporations'. *Journal of International Business Studies* 20/3: 489–514.
- Merton, Robert K  
1940 'Bureaucratic structure and personality'. *Social Forces* 18: 560–568.
- Meyer, Marshall, and M. Craig Brown  
1977 'The process of bureaucratization'. *American Journal of Sociology* 83: 364–385.
- Meyer, Marshall W., and Brian Rowan  
1977 'Institutionalised organisations: Formal structure as myth and ceremony'. *American Journal of Sociology* 83: 340–363.
- Mileti, Denis S., David F. Gillespie, and J. Eugene Haas  
1977 'Size and structure in complex organizations'. *Social Forces* 56: 208–217.

- Miller, C. Chet, William H. Glick, Yau De Wang, and George P. Huber  
1991 'Understanding technology-structure relationships: Theory development and meta-analytic theory testing'. *Academy of Management Journal* 34/2: 370–399.
- Miller, Danny  
1987 'The structural and environmental correlates of business strategy'. *Strategic Management Journal* 1: 55–76.
- Miller, Danny, Cornelia Droge, and Jean Marie Toulouse  
1988 'Strategic process and content as mediators between organizational context and structure'. *Academy of Management Journal* 31/3: 544–569.
- Miller, George A.  
1987 'Meta-analysis and the culture-free hypothesis'. *Organization Studies* 8/4: 309–326.
- Moch, Michael K.  
1976 'Structure and organizational research allocation'. *Administrative Science Quarterly* 21: 661–674.
- Mohr, Lawrence B.  
1971 'Organizational technology and organizational structure'. *Administrative Science Quarterly* 16/4: 444–459.
- Montanari, John R., and Sara M. Freedman  
1981 'Organization structure and administrative control: A question of dimensionality'. *Journal of Management* 7/1: 17–31.
- Palumbo, Dennis J.  
1969 'Power and role specificity in organization theory'. *Public Administration Review* 29: 237–248.
- Paulson, Steven K.  
1974 'Causal analysis of interorganizational relations: An axiomatic theory revisited'. *Administrative Science Quarterly* 19: 319–337.
- Payne, Roy L., and Roger Mansfield  
1973 'Relationships of perceptions of organizational climate to organizational structure, context and hierarchical position'. *Administrative Science Quarterly* 18: 515–526.
- Pennings, Johannes M.  
1973 'Measures of organizational structure: A methodological note'. *American Journal of Sociology* 79: 686–704.
- Pennings, Johannes M.  
1992 'Structural contingency theory: A reappraisal' in *Research in organizational behavior*, Vol. 14. Barry M. Staw and Larry L. Cummings (eds), 267–309. Greenwich, CT: JAI Press.
- Pennings, Johannes M.  
1998 'Structural contingency theory' in *Handbook of work and organizational psychology*, Vol. 4. Pieter J. D. Drenth, Henk Thierry and Charles J. de Wolff (eds), 39–60. Hove: Psychology Press.
- Pfeffer, Jeffrey  
1982 *Organizations and organization theory*. Boston, MA: Pitman.
- Pfeffer, Jeffrey  
1997 *New directions for organization theory*. New York: Oxford University Press.
- Prethus, Robert V.  
1961 'Welfare bureaucracy in traditional society'. *Administrative Science Quarterly* 6: 1–24.
- Price, James L., and Charles W. Mueller  
1986 *Handbook of organizational measurement*. Boston, MA: Pitman.
- Prien, E. P., and W. W. Rowan  
1971 'An analysis of organizational characteristics'. *Organizational Behavior and Human Performance* 6: 215–234.
- Pugh, Derek S., and David J. Hickson  
1976 *Organizational structure in its context: The Aston programme I*. Westmead: Saxon House.

- Pugh, Derek S., David J. Hickson, C. R. Hinings, Keith M. MacDonald, Christopher Turner, and Thomas. Lupton  
1963 'A conceptual scheme of organizational analysis'. *Administrative Science Quarterly* 8: 289–315.
- Pugh, Derek S., David J. Hickson, Christopher R. Hinings, and C. Turner  
1968 'Dimensions of organizational structure'. *Administrative Science Quarterly* 13: 65–105.
- Reimann, Bernard C.  
1973 'On the dimensions of bureaucratic structure: An empirical reappraisal'. *Administrative Science Quarterly* 18: 462–476.
- Rosenthal, Robert  
1984 *Meta-analytical procedures for social research*. Beverly Hills, CA: Sage.
- Rousseau, Denise M.  
1978 'Characteristics of departments, positions, and individuals: Contexts for attitudes and behavior'. *Administrative Science Quarterly* 23: 521–540.
- Routamaa, Vesa  
1985 'Organizational structuring: An empirical analysis of the relationship and dimensions of structures in certain Finnish companies'. *Journal of Management Studies* 22/5: 498–522.
- Sathe, Vijay  
1978 'Institutional versus questionnaire measures of organizational structure'. *Academy of Management Journal* 21/2: 227–238.
- Scott, W. Richard  
1977 'Effectiveness in organizational effectiveness studies' in *New perspectives on organizational effectiveness*. Paul S. Goodman and Johannes M. Pennings (eds), 63–95. San Francisco, CA: Jossey-Bass.
- Scott, W. Richard  
1981 *Organizations: Rational, natural and open systems*. Englewood Cliffs, NJ: Prentice Hall.
- Sells, S. B.  
1963 'An interactionist looks at the environment'. *American Psychologist* 18: 696–702.
- Selznick, Philip  
1949 *TVA and the grass roots*. Berkeley, CA: University of California Press.
- Shea, Gregory P., and Richard A. Guzzo  
1987 'Groups as human resources' in *Research in personnel and human resources management*, Vol. 5. Kendrith M. Rowland and Gerald R. Ferris (eds), 323–356. Greenwich, CT: JAI Press.
- Shrader, Charles B., James R. Lincoln, and Alan N. Hoffman  
1989 'The network structures of organizations: Effects of task contingencies and distributional form'. *Human Relations* 42/1: 43–66.
- Smith, Vicki  
1997 'New forms of work organization' in *Annual Review of Sociology*, Vol. 23. 315–339. Palo Alto: Annual Reviews Inc.
- Starbuck, William H.  
1981 'A trip to view the elephants and rattlesnakes in the garden of Aston' in *Perspectives on organizational design and behavior*. Andrew H. van de Ven and William F Joyce (eds), 167–198. New York: Wiley.
- Sutton, Robert I., and Denise M. Rousseau  
1979 'Structure, technology, and dependence on a parent organization: Organizational and environmental correlates of individual responses'. *Journal of Applied Psychology* 64/6: 675–687.
- Tayeb, Monir  
1987 'Contingency theory and culture: A study of matched English and the Indian manufacturing firms'. *Organization Studies* 8/3: 241–261.
- Thompson, James D.  
1967 *Organizations in action*. New York; London: McGraw-Hill.

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| <p>Udy, Stanley H.<br/>1959 "'Bureaucracy" and "rationality" in Weber's organization theory: An empirical study'. <i>American Sociological Review</i> 24: 791–795.</p> <p>van de Ven, Andrew J., and Diana L. Ferry<br/>1980 <i>Measuring and assessing organizations</i>. New York: Wiley.</p> <p>Vaughan, Diane<br/>1999 'The dark side of organizations: Mistake, misconduct, and disaster' in <i>Annual review of sociology</i>, Vol. 25. 271–305. Palo Alto, CA: Annual Reviews Inc.</p> <p>Wally, Stefan, and J. Robert Baum<br/>1994 'Personal and structural determinants of the pace of strategic decision making'. <i>Academy of Management Journal</i> 37/4: 932–956.</p> <p>Walton, Eric J.<br/>1980 'Formal structure: A review of the empirical relationships between task differentiation, role prescription and authority dispersion'. <i>Organisation Studies</i> 1/3: 229–252.</p> <p>Walton, Eric J.<br/>1981 'The comparison of measures of organization structure'. <i>Academy of Management Review</i> 6/1: 155–160.</p> | <p>Weber, Max<br/>1946 <i>From Max Weber: Essays in sociology</i>. Hans H. Gerth and C. Wright Mills (eds). New York: Oxford University Press.</p> <p>Wong, Gilbert Y. Y., and Philip H. Birnbaum-More<br/>1994 'Culture, context and structure: A test on Hong Kong banks'. <i>Organization Studies</i> 15/1: 99–123.</p> <p>Yasai-Ardekani, Masoud<br/>1989 'Effects of environmental scarcity and munificence on the relationship of context to organizational structure'. <i>Academy of Management Journal</i> 32/1: 131–156.</p> <p>Zeffane, Rachid<br/>1989 'Computer use and structural control: A study of Australian enterprises'. <i>Journal of Management Studies</i> 26/6: 621–648.</p> <p>Zinn, Jacqueline S., and Vincent Mor<br/>1998 'Organizational structure and the delivery of primary care to older Americans'. <i>Health Services Research</i> 33/2 (Part 2): 354–380.</p> |
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## Eric Walton

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