SPRING 1981

INTERNATIONAL STUDIES OF MANAGEMENT & ORGANIZATION

•

Business Administration and Organization Studies in the Federal Republic of Germany

GUEST EDITORS: RUDI K. BRESSER
AND ROGER L. M. DUNBAR

A JOURNAL OF TRANSLATIONS

International Studies of Management & Organization
SPRING 1981/VOL. XI, NO. 1
TABLE OF CONTENTS

BUSINESS ADMINISTRATION AND ORGANIZATION STUDIES IN THE FEDERAL REPUBLIC OF GERMANY

Guest Editors: Rudi K. Bresser, Baruch College,
City University of New York, and
Roger L. M. Dunbar, New York University
New York, N.Y., USA

M. E. Sharpe, Inc. 80 BUSINESS PARK DRIVE, ARMONK, N.Y. 10504

INTERNATIONAL STUDIES OF MANAGEMENT & ORGANIZATION contains translations of material that has appeared originally in scholarly journals and books throughout the world.

EDITOR: J. J. Boddewyn, Baruch College (CUNY)
ASSISTANT EDITOR: Betty Appelbaum, M. E. Sharpe, Inc.

PUBLISHER: Myron E. Sharpe
EDITORIAL DIRECTOR: Arnold C. Tovell
PRODUCTION MANAGER: Theresa Hughes
ADVERTISING MANAGER: Deborah D. Glasserow

Four issues per year. Annual subscription rate for institutions, $127.00; for individuals associated with subscribing institutions, certifying that subscription is for personal use, $33.00.

All editorial correspondence should be addressed to Professor J. J. Boddewyn, Baruch College (City University of New York), 17 Lexington Avenue, New York, New York 10010.

Int. Studies of Man. & Org., Vol. XI, No. 1, pp. 3-16
M. E. Sharpe, Inc., 1981

PREFACE

Studies in organization and management developed from studies of business administration (Betriebswirtschaft) in Germany. The aim of this issue of International Studies of Management & Organization is to help English-speaking readers become familiar with the types and range of studies that can generally be found in the literature on organizations in the Federal Republic of Germany (FRG).

In order to appreciate these studies, it is necessary to consider the historical context. We shall therefore begin by outlining the history of business administration studies in Germany, noting, particularly, the intellectual leaders and ideas that dominated the discipline before the end of World War II, and then describe the new emphases that characterize current studies being done in the Federal Republic of Germany.

Business Administration in Germany before 1945

It was, unquestionably, Eugen Schmalenbach (1873–1955) who established business administration as a separate field of study in Germany (Hax, 1973; Hundt, 1977). Specifically, Schmalenbach (1931, 1934) developed a terminology for business administration problems, which he then integrated with existing, technically more limited, approaches to business studies being done in Germany at the time to form a new general theory of business administration. Schmalenbach was concerned with measurement. In his theory he made many suggestions for improving organizational cost accounting, and within a short time many of these were adopted in practice. Although Schmalenbach's theory was criticized by some (Rieger, 1954), it dominated all other ideas about business administration before and up until the end of World War II.

Schmalenbach's theory can best be understood when viewed

in its historical context. Schmalenbach had experienced the confusion, suffering, and helplessness associated with the complete collapse of the German market system during the 1920s. He doubted whether markets could be relied upon to work effectively in the future. Schmalenbach had observed that large business enterprises should contribute to the general well-being of the country rather than simply accumulate profits for a restricted group of shareholders. Therefore, he focused his efforts on developing measures for assessing the performance contributions made by large business enterprises to society in general. Ideally, he believed, such measures should evaluate enterprise activities that contributed to the general good, and that other activities — profits from speculation, for example — should be excluded. In his search for such measures, Schmalenbach significantly improved financial reporting and cost-accounting techniques; but he was never able to identify the ideal measures of enterprise contribution that he sought.

Schmalenbach (1934) was concerned about the strong tendencies he observed in large enterprises to invest in technologies that rationalized production processes. On the one hand, this investment improved efficiency; but it also led to a permanent increase in fixed costs, a decreased importance of variable costs, and an overall reduction in enterprise capacity to respond flexibly to changes in economic conditions. Schmalenbach feared that should there be another economic crisis in Germany like that of the 1920s, highly rationalized enterprises would attempt to adapt not by reducing production, but rather by increasing output to gain additional economies of scale and then attempt to increase demand through reduced prices to the point where prices just covered variable costs. Over the long term, such a strategy would ensure more and more losses to individual firms; and this destructive cycle could, in Schmalenbach's opinion, be stopped only when industry members formed cartels to control prices. These cartels would then destroy what was left of the free market system.

In light of this experience and these beliefs, it is not surprising that Schmalenbach was very pessimistic about the fu-

ture of the free market system. He made a famous speech in Vienna (Schmalenbach, 1928) in which he presented his opinion that world developments at that time confirmed Karl Marx's prognosis that the capitalist economic order based on free markets would eventually collapse. Schmalenbach suggested that it did not make sense to wait for this collapse. He proposed that the free market system be replaced by a controlled system in which the state played a central role in maintaining order.

Heinrich Nicklisch (1876–1946) was another important, almost exclusively normative, theorist during this period who was particularly concerned with organization. Although Schmalenbach and Nicklisch disagreed on many points, they both believed that the general welfare of society was of paramount importance. Nicklisch (1922, 1932) viewed organizations as the culmination of all social and natural structuring principles rather than as rational systems for production; he considered them individually important only because together they made up a complete economic system. Nicklisch was particularly concerned with ways of developing a general sense of belonging and community. He thought that everybody should be directed by a profound sense of community responsibility and behave within organizations according to the obligations they accepted on becoming members. He argued that by committing themselves to their organizations, people could achieve inner freedom and peace. To enhance involvement, Nicklisch recommended organizational structures allowing representative democracy along with profit-sharing plans for employees.

Progress toward a controlled economy was to be achieved through a fascist rather than a communist revolution. Nicklisch was recognized as the leading organization theorist during the National Socialist period. Schmalenbach, on the other hand, was one of the few professors of business administration who from the beginning — for both objective and personal reasons (his wife was Jewish) — distanced himself from the National Socialists. Nevertheless, it was belief in Schmalenbach's theories that helped persuade many professors of business

administration to embrace the new system (Gmähle, 1968; Hundt, 1977). The National Socialist program promised that the anarchy associated with market systems would be replaced by a centrally controlled economy in which the welfare of the total society would be given priority over any individual benefits.

During the National Socialist period, new approaches to business administration were explored. Consideration was given to replacing the system based on profit maximization with a more complicated system that based prices on costs incurred, included an excessive profits tax, and was organized toward allowing systematic comparisons among similar enterprises. To facilitate this, new laws and regulations were passed to control prices and standardize accounting methods. "Adequate profit rates" (angemessene Gewinne) were prescribed for different branches of the economy, and companies had to base prices on these prescriptions. Individual companies received directions concerning what to produce, in what quantities and qualities. Thus, business firms knew that they would be able to sell their products for the prices they had calculated because state control defined to whom to sell products and from whom to obtain raw materials. Foreign trade was also organized and controlled by government agencies. The role of the manager during this period was to implement an effective National Socialist economy. Many company managers and owners endorsed the National Socialist system because it absorbed all entrepreneurial risks. Business administration studies were more consistently directed toward understanding state-controlled economic systems than they have ever been (Hundt, 1977. P. 125).

Current Organization Studies in the Federal Republic of Germany

Business administration and the associated organization theories had become so entwined with and directed toward serving the National Socialist regime from 1933 to 1945 that after Germany's defeat and occupation, drastic reorientations were to be expected. In fact, very little happened in West Ger-

many until 1951, when Erich Gutenberg (1979 [first edition, 1951]), who had previously endorsed the economic policies proposed by the National Socialist system (Gutenberg, 1939), presented a new general theory. This new theory quickly became dominant (Albach, 1977; Hundt, 1977; Kilger, 1962; Koch, 1957) and the basis for new research.

Gutenberg's new theory was apolitical. Schmalenbach's normative concern for ways to benefit society in general was completely absent, as was any mention of ways to stabilize a centrally controlled economy. In its place Gutenberg proposed that research in business administration should explore rational and logical ways to organize to achieve desired results. Thus, much of Schmalenbach's work on cost theory could continue to be included as technical contributions to rational goal accomplishment. In this area Schmalenbach's theories no longer appeared so controversial (Grochla, 1973; Hax, 1973; Muenstermann, 1973), and he was again accorded an honored place within the academic community. Nevertheless, although a journal still exists in West Germany bearing Schmalenbach's name, and although there is a Schmalenbach Society (Vereinigung) to honor him and promote awareness of his work, a complete edition of Schmalenbach's work has never yet been published.

Gutenberg proposed a technocratic theory centrally concerned with the factors that may be related to productivity and the principles that determine these relationships. Organizations combine elementary factors — human resources, operational facilities, raw materials. The effectiveness of this combination depends on management (dispositiver Faktor), for which it is possible to derive principles. Gutenberg's effectiveness concept corresponds to that used in neoclassic microeconomic theory: minimize waste (Gutenberg, 1979. P. 470).

Gutenberg acknowledges that some principles are dependent on the prevailing political system. For example, profit maximization is appropriate in capitalist systems, and plan fulfillment, in centrally administered economies. On the other hand, he also argues that the principles for managing production processes are independent of the political system. He suggests

that this apolitical technical area, divorced from general societal issues and values, defines the appropriate area to which responsible research should be restricted and within which researchers should develop a "sober respect for objective facts" (Gutenberg, 1957). Linhardt (1963, 1969) criticized the opportunistic convenience and social irresponsibility that, within its historical context, may be associated with Gutenberg's approach; but he received little support. Instead, researchers answered that a "sober respect for objective facts" clearly indicated social responsibility and that future research depended on the maintenance of such a position (Albach, 1977).

Rather than conceptualize organizations as extensive social systems, as Nicklisch had done, Gutenberg focused his attention on rational ways to organize production factors, specifically work, organizational facilities, and materials (Kieser and Kubicek, 1978). Individuals and organizational managers are assumed to behave in consistent, goal-directed ways. Organization structure is viewed simply as an extended arm of the firm's management (Gutenberg, 1979. P. 236).

Organization theory in West Germany emphasized this functional approach well into the 1960s. The aim was to develop overall rules and principles to help practitioners reach rational decisions and solve concrete problems (Bleicher, 1966; Grochla, 1972; Kosiol, 1962, 1966; Schweitzer, 1964; Wild, 1966). With such a viewpoint, Weber's (1947) work on functional bureaucracies was reconsidered, after being largely ignored for many years. This traditional approach toward organizations still plays an important, if not dominant, role in West German organization and management theory. Questions such as whether organizations should adopt functional or divisional structures (Eisenführ, 1970; Poensgen, 1973; Welge, 1975), or whether matrix or project management structure may be more effective, are still primary research concerns (Schröder, 1970; Thom, 1973, 1974; Wild, 1972).

Articles in This Issue

Excerpts from Nicklisch (1922) and Gutenberg (1979) are the

first articles presented in this issue. Nicklisch is included to demonstrate the sorts of ideas that characterized the literature on organizations before and during the National Socialist period. The work of Nicklisch is highly normative and often emotional, emphasizing the strongly moral undertone that characterized thinking at that time. On the other hand, his dynamic style, his openness to influences from other disciplines, and the direct way he confronts issues that still seem highly relevant today are all striking. His very broad focus is in sharp contrast to the rational, reductionist emphasis that has characterized the West German literature on organizations since 1945.

When translating Gutenberg's work, we were very tempted to replace the term organization with organizing in order to highlight what we see as the potential dynamic implications of this study. We did not do so because Gutenberg's approach, as opposed to Nicklisch's, is static and does not emphasize the cognitive flexibility necessary for a dynamic organizing process. Indeed, he was against such an approach. Perhaps as a result of this position, which was typical of the postwar cautiousness that characterized the discipline, a line of organizational research based on cognitive or psychological theories did not develop in Germany until very recently.

Traditional organization theory borrowed extensively from U.S. management theories and findings. U.S. publications have also profoundly influenced more recent research in West Germany. During the 1960s the notion that the enterprise could be viewed as a decision-making unit was made popular by Heinen (1966, 1968, 1976). The increasing recognition of human cognitive limits that lead to bounded rationality in organizations, and that are manifested in notions such as goals as independent constraints, acceptable-level decision rules, and sequential attention to goals, seriously challenged the purely rational assumptions made in Gutenberg's theory. These challenges did not bring about major changes, however. The basic Gutenberg model was integrated into Heinen's decision-oriented concept of business administration. Along with the normative endeavors of traditional organization theory, formal, logically deductive,

mathematical theories and models of rational decision-making are still the dominating aspect of organization studies in West Germany (Hanssmann, 1970; Hax, 1965; Laux 1979a, b; Müller-Hagedorn, 1972; Müller-Merbach, 1972, Schauenberg, 1978a; Schüler, 1978; Schweitzer, 1973). Although social-psychological aspects of decision making are generally still relatively neglected, work describing decision-making and change processes (Kirsch 1970, 1971a, b; Kirsch, Esser, and Gabele, 1979; Wilpert, 1977; Witte, 1968, 1972, 1976) or exploring contingency approaches (Bresser, 1979; Budde, 1979; Kieser, 1974a, b; Kieser and Kubicek, 1972) has appeared in the last decade.

The article by Schauenberg (1978b), the third in this issue, is representative of the formal logically deductive approach to studying decision making in organizations. Gabele's (1978) article on innovation structures is illustrative of the behavioral studies that have broken away from rational premises and describe decision-making processes. Wollnik and Kubicek's (1978) article is an example of contingency studies. It reanalyzes data on structural relationships found in English studies and develops some empirically based insights concerning organizational coordination.

We wish to conclude this introduction with some personal observations. In reading Schmalenbach and Nicklisch, we were struck by the enthusiasm, idealism, breadth, and hope these theorists demonstrated. The National Socialists co-opted many ideas associated with these theorists, and then carried out terrible abuses that were no part of the original theories. West German business administration researchers have only very infrequently explored the fascist tragedy and their involvement in it. Instead, for at least twenty years, reductionist and normative theories emphasizing rationality have dominated organizational research. As a result, there are limitations evident in the work selected, and we believe these studies can best be appreciated and criticized if the historical context is taken into account. We also think that the real contrasts, strengths, and weaknesses that characterize these translated studies are representative of the type of work currently being done in

the Federal Republic of Germany.

In any case, this issue of International Studies of Management & Organization will introduce management- and organization-theory scholars to significant excerpts from the relatively little known German literature on the subject.*

References

Albach, H. (1977) "Überwindung des Gegensatzes zwischen Volks-und Betriebswirtschaftslehre. Ein Überblick über die Entwicklung der letzten fünfzig Jahre. Zum achtzigsten Geburtstag von Erich Gutenberg." Frankfurter Allgemeine Zeitung, December 13, 1977, No. 289, p. 12.

Bleicher, K. (1966) Zentralisation und Dezentralisation von Aufgaben in der Organisation der Unternehmung. Berlin: Duncker & Humblot.

Bresser, R. (1979) Fachbereichsorganisationen — Eine empirische Untersuchung der Zusammenhänge zwischen Organisationsstruktur, Kontext und Erfolg. Frankfurt/Main: Haag & Herchen.

Budde, A. (1979) Die Organisationsstruktur von Investitionsentscheidungen in Unternehmungen. Ergebnisse einer explorativen Erhebung. Frankfurt/Main: Lang.

Eisenführ, F. (1970) "Zur Entscheidung zwischen funktionaler und divisionaler Organisation." Zeitschrift für Betriebswirtschaft, 40, 727–46.

Gabele, E. (1978) "Das Management von Neuerungen — Eine empirische Studie zum Verhalten, zur Struktur, zur Bedeutung und zur Veränderung von Managementgruppen bei

*An entire issue of this journal (Vol. III, No. 1-2, Spring-Summer 1973), guest-edited by Heinz Hartmann, dealt with "German Management." The Summer 1972 issue (Vol. II, No. 2) contains an article by E. Witte, referred to in this article; and the Winter 1980-81 issue (Vol. X, No. 4) has one, by Maurice, Sorge, and Warner, comparing French, German, and British manufacturing units. — J.B., Editor, ISMO.

tiefgreifenden Neuerungsprozessen in Unternehmen." Zeitschrift für betriebswirtschaftliche Forschung, 30, 194–226.
Gmähle, P. (1968) Betriebswirtschaftslehre und Nationalsozialismus. Dissertation. Erlangen-Nürnberg.
Grochla, E. (1972) Unternehmensorganisation. Reinbek bei Hamburg: Rowohlt.
Grochla, E. (1973) "Der Beitrag Schmalenbachs zur betriebswirtschaftlichen Organisationslehre." Zeitschrift für betriebswirtschaftliche Forschung, 25, 555–78.
Gutenberg, E. (1939) "Die Stellung des Rechnungswesens im Aufbau der gewerblichen Wirtschaft." In K. Bräuer (Ed.), Bericht über den Tag der Deutschen Wirtschaftswissenschaft 1938. Stuttgart and Berlin: Kohlhammer. Pp. 207–235.
Gutenberg, E. (1957) Betriebswirtschaftslehre als Wissenschaft. Krefeld: Scherpe.
Gutenberg, E. (1979) Grundlagen der Betriebswirtschaftslehre. Erster Band. Die Produktion. (23rd ed.) (1st ed., 1951). Berlin–Heidelberg–New York: Springer.
Hanssmann, F. (1970) "Optimierung der Organisationsstruktur." Zeitschrift für Betriebswirtschaft, 40, 19–30.
Hax, H. (1965) Die Koordination von Entscheidungen. Cologne: Heymann.
Hax, K. (1973) "Schmalenbach aus der Sicht der neuzeitlichen Betriebswirtschaftslehre." Zeitschrift für betriebswirtschaftliche Forschung, 25, 495–99.
Heinen, E. (1966) Das Zielsystem der Unternehmung. (2nd ed., 1971) Wiesbaden: Gabler.
Heinen, E. (1968) Einführung in die Betriebswirtschaftslehre. (6th ed., 1976) Wiesbaden: Gabler.
Heinen, E. (1976) Grundfragen der entscheidungsorientierten Betriebswirtschaftslehre. Munich: Goldmann.
Hundt, S. (1977) Zur Theoriegeschichte der Betriebswirtschaftslehre. Cologne: Bund.
Kieser, A. (1974a) "Der Einfluss der Fertigungstechnologie auf die Organisationsstruktur industrieller Unternehmungen." Zeitschrift für betriebswirtschaftliche Forschung, 26, 569–90.
Kieser, A. (1974b) "Der Einfluss der Umwelt auf die Organisa-

tionsstruktur der Unternehmung." Zeitschrift für Organisation, 43, 302-314.

Kieser, A., and Kubicek, H. (1972) "Der Einfluss der Informationstechnologie auf die Organisationsstruktur." In E. Grochla and N. Szyperski (Eds.), Struktur und Steuerung der Unternehmung bei Automation der Datenverarbeitung. Cologne: BIFOA-Fachtagung.

Kieser, A., and Kubicek, H. (1976) Organisation. Berlin and New York: De Gruyter.

Kieser, A., and Kubicek, H. (1978) Organisationstheorien. Vols. I and II. Stuttgart: Poeschel.

Kilger, W. (1962) "Zum wissenschaftlichen Werk Erich Gutenbergs." Zeitschrift für Betriebswirtschaft, 32. 689–92.

Kilger, W. (1973) "Schmalenbachs Beitrag zur Kostenlehre." Zeitschrift für betriebswirtschaftliche Forschung, 25, 522–40.

Kirsch, W. (1970) Entscheidungsprozesse. Vol. I. Verhaltenswissenschaftliche Ansaetze der Entscheidungstheorie. Wiesbaden: Gabler.

Kirsch, W. (1971a) Entscheidungsprozesse. Vol. II. Informationsverarbeitungstheorie des Entscheidungsverhaltens. Wiesbaden: Gabler.

Kirsch, W. (1971b) Entscheidungsprozesse. Vol. III. Entscheidungen in Organisationen. Wiesbaden: Gabler.

Kirsch, W., Esser, W.-M., and Gabele, E. (1979) Das Management des geplanten Wandels von Organisationen. Stuttgart: Poeschel.

Koch, H. (1957) "Über einige Grundfragen der Betriebswirtschaftslehre." Zeitschrift für handelswissenschaftliche Forschung, 9, 569–97.

Kosiol, E. (1962) Organisation der Unternehmung. Wiesbaden: Gabler.

Kosiol, E. (1966) Die Unternehmung als wirtschaftliches Aktionszentrum. Reinbek bei Hamburg: Rowohlt.

Kubicek, H. (1975) Informationstechnologie und organisatorische Regelungen. Berlin: Duncker & Humblot.

Laux, H. (1979a) Der Einsatz von Entscheidungsgremien-Grundprobleme der Organisationslehre in entscheidungs-

theoretischer Sicht. Heidelberg: Springer.

Laux, H. (1979b) Grundfragen der Organisation — Delegation, Anreiz und Kontrolle. Berlin–Heidelberg–New York: Springer.

Linhardt, H. (1963) Angriff und Abwehr im Kampf um die Betriebswirtschaftslehre. Berlin: Duncker & Humblot.

Linhardt, H. (1969) "Entscheidungen in der Unternehmung über Betriebsziele, Betriebsmittel und Betriebsabläufe," Betriebswirtschaftliche Forschung und Praxis, 21, 673–91.

Müller-Hagedorn, L. (1971) "Ein Ansatz zur Optimierung der Organisationsstruktur." Zeitschrift für Betriebswirtschaft, 41, 705-716.

Müller-Merbach, H. (1972) "OR-Ansaetze zur optimalen Abteilungsgliederung in Institutionen." In W. Kirsch (Ed.), Unternehmensfuehrung und Organisation. Wiesbaden: Gabler.

Münstermann, H. (1973) "Schmalenbachs Beitrag zur Bilanzlehre." Zeitschrift für betriebswirtschaftliche Forschung, 25, 500–521.

Nicklisch, H. (1922) Der Weg Aufwärts! Organisation. Versuch einer Grundlegung. (1st ed., 1919) Stuttgart: Poeschel.

Nicklisch, H. (1932) Die Betriebswirtschaft. (7th ed.) Stuttgart: Poeschel.

Poensgen, O. H. (1973) Geschaeftsbereichsorganisation. Opladen: Westdeutscher Verlag.

Rieger, W. (1954) Schmalenbachs Dynamische Bilanz. (2nd ed.) Stuttgart: Kohlhammer.

Schauenberg, B. (1978a) Zur Logik kollektiver Entscheidungen. Wiesbaden: Gabler.

Schauenberg, B. (1978b) "Zur Bedeutung der Transitivitätsvoraussetzung in der Entscheidungstheorie." Zeitschrift für die gesamte Staatswissenschaft, 134, 166-87.

Schmalenbach, E. (1928) "Die Betriebswirtschaftslehre an der Schwelle der neuen Wirtschaftsverfassung." Zeitschrift für handelswissenschaftliche Forschung, 21, 241–51.

Schmalenbach, E. (1931) Dynamische Bilanz. (5th ed.) Leipzig: G. A. Gloeckner (13th ed., Cologne and Opladen: Westdeutscher Verlag, 1962).

Schmalenbach, E. (1934) Selbstkostenrechnung und Preispolitik. (6th ed.) Leipzig: G. A. Gloeckner. (8th ed., Cologne and Opladen: Westdeutscher Verlag, 1963).

Schröder, H. J. (1970) Projekt-Management. Eine Einfuehrungskonzeption für aussergewöhnliche Vorhaben. Wiesbaden: Gabler.

Schüler, W. (1978) "Teamtheorie als Komponente betriebswirtschaftlicher Organisationstheorie." Zeitschrift für Betriebswirtschaft, 48, 343–55.

Schweitzer, M. (1964) Probleme der Ablauforganisation in Unternehmungen. Berlin: Duncker & Humblot.

Schweitzer, M. (1973) "Zur Bestimmung optimaler Reorganisationsstrategien." In E. Grochla and N. Szyperski (Eds.), Modell- und computergestützte Unternehmungsplanung. Wiesbaden: Gabler.

Thom, N. (1973) "Zur Leistungsfähigkeit der Projekt-Matrix-Organisation." Industrielle Organisation, 42, 123-28.

Thom, N. (1974) "Innovationsfördernde Organisations- und Führungsformen: Projekt- und Produktmanagement." Der Betriebswirt, 15, 118–25.

Weber, M. (1947) The Theory of Social and Economic Organization. Glencoe, Ill.: The Free Press.

Welge, M. (1975) Profit-Center-Organisation. Organisatorische Analyse von Strukturbewertungsproblemen in funktionalen und profit-center-orientierten Organisationen. Wiesbaden: Gabler.

Wild, J. (1966) Grundlagen und Probleme der betriebswirtschaftlichen Organisationslehre. Berlin: Duncker & Humblot.

Wild, J. (1972) Product-Management. Ziele, Kompetenzen und Arbeitstechniken des Produktmanagements. Munich: Moderne Industrie.

Wilpert, B. (1977) Führung in deutschen Unternehmen. Berlin and New York: De Gruyter.

Witte, E. (1968) "Phasen-Theorem und Organisation komplexer Entscheidungsverlaufe." Zeitschrift für betriebswirtschaftliche Forschung, 20, 625–47. [Translated as "Field Research on Complex Decision-making Processes — The Phase

Theorem" in International Studies of Management & Organization, 1972, II (2) (Summer), 156–82.]

Witte, E. (1972) Das Informationsverhalten in Entscheidungsprozessen. Tübingen: Mohr.

Witte, E. (1976) "Kraft und Gegenkraft im Entscheidungsprozess." Zeitschrift für Betriebswirtschaft, 46, 319–26.

Wollnik, M., and Kubicek, H. (1976) "Einflussfaktoren der Koordination in Unternehmungen. Eine Neuformulierung der empirischen Ergebnisse von Pugh et al. und Child." Zeitschrift für betriebswirtschaftliche Forschung, 28, 502–524.

Rudi K. Bresser
Roger L. M. Dunbar

Rudi K. Bresser is Assistant Professor of Management at Baruch College, City University of New York, and Konrad Adenauer Foundation Research Fellow in the United States. Roger L. M. Dunbar is Associate Professor of Management at the Graduate School of Business Administration, New York University, New York, N. Y.

Int. Studies of Man. & Org., Vol. XI, No. 1, pp. 17-25
M. E. Sharpe, Inc., 1981

THE ORGANIZATION AND ITS LAWS

Heinrich Nicklisch (Germany)

Organizing means to be active in an organism's structural development; it does not mean to be blindly destructive, but rather constructive. It means purposely to extend or design organisms or simply to help them to come into existence. Put succinctly, it means to be active as a thinking being....

The study of organizations involves recognition of the regularities (laws) in this human activity and their combination into a structured body of knowledge, a system within science.

The laws of organization are available to people in their conscience. Through conscience, laws are immediately and always evident, even though they are unclear. Through experience with oneself and with one's environment, to the extent that recognition advances to insight about regularities, laws are confirmed in one's consciousness in the course of one's life.

All organizing begins with needs and ends with satisfaction of needs. From an economic standpoint, the desiring human, the consumer, is the A to Z of all organizing and all organizations. Specifically, people are the focal point; because of their

---

This article is taken from Heinrich Nicklisch's Der Weg Aufwärts! Organisation. (2nd ed.) Stuttgart: C. E. Poeschel Verlag, 1922. Pp. 50–101. It has been abridged and translated by Roger L. M. Dunbar and Rudi K. Bresser.

Dr. Heinrich Nicklisch taught as Professor of Business Administration at the Handelshochschule in Berlin.

needs, they intervene in the environment, relate it to themselves, and attempt to redesign it in hope of obtaining satisfaction.

The process involves imagining goals, setting goals, and then the consequences of goal setting. Before the consequences can be evident, humanly initiated actions and, usually, also some natural event that has resulted from the development of the basis for goal setting must occur....

A distinction can be made between bases for goal setting that continue indefinitely and others of more fleeting duration. Longer-lasting goals can produce the same effect several times, whereas goals of a more fleeting duration frequently cause only one effect. Both kinds of goals are important for living. But in order to satisfy constantly recurring needs, people must focus on long-term goals if they want to assert themselves as thinking beings. Only through these enduring goals can a person take command of nature. Therefore, continuous bases for goal setting are particularly important....

People determine the total goal structure. The main goal is the satisfaction of mental and physical needs that find their unity in the conscience. Then follows a series of goals that immediately serve the main goal in the sense that the consequences that are sought also satisfy the main goal. Again, to these goals still other subgoals are attached, which must be fulfilled before the others....

Imagined goals that agree with one another are viewed by people as the same from a practical standpoint; such goals can be merged and then realized by a community. This process leads to social organisms. As a result, either realization processes can be facilitated or quality or quantity can be improved or, indeed for the first time, be made possible. Because some goals are shared by everybody whereas others are not, the extent of the effect of different goals varies. The most general, the satisfaction of needs, is the same for everybody....

There is a community will to the extent that individual wills derive from a similar or identical cultural situation and from similar or identical needs or motives. These lead to similar

or identical imagined and actual goals. The individual will seems to be a part of the community will to the extent that similar or identical goals are mutually adopted. Voting, as in political organizations or elections, indicates how far this community will actually extends. The bonds that establish a unity despite many individual believers extend still further; they also include those who are a part of the external community, even though they may want to be different.

To further the goals of a community, the community will creates a leadership position, to which every member has access, and as many lower-ranking positions as there are community members. Between the lower-ranking positions and the leadership position are middle positions, depending on what is required by the mutual goal. The community then wills and acts and, willing and acting, dominates its domain so that the organism can be extended and strengthened.

The leadership position can be collegial, in that the power of a single will is transferred to several individuals, or directorial, in that one person exercises ultimate power. In both cases the will of the leadership position may not be thought of as the community's will without the overt or silent participation of its members. The leadership position must always be very sensitive, and members must pay close attention to their community feelings if this necessary codetermination is to materialize in forms that are not harmful. Of particular importance are borderline cases in which matters are half outside the general goals of the community and in that area where the community will starts to splinter into many individual wills. Such cases will lead to difficult deliberations within a collegial leadership group during which needed sensitivity is easily lost. And the single leader, like collegial groups, can finally do nothing in such cases but assure, in a humanly honorable and goal-directed way, that the members give their consent....

The end results of organizational activities today are usually not directly for one's own satisfaction, but rather for the satisfaction of others, providing that one's price can be met. This means that although the reason for occupational involvement

is still the satisfaction of one's own needs, it is no longer immediate satisfaction. Rather, end results are deliberately determined so as to acquire needed goods and services through transactions.... Transactions then take place with the help of a means of exchange in which one party supplies the means of exchange and the second, the desired means for satisfaction. Everybody is aware of this. Therefore, the perception that an exchangeable commodity or component is complete appears as a conscious motive to act in a manner that is appropriate to the plan....

In this way the circle of human activity is completed. It begins with consciousness of needs, motivations, and goal-directed planning; takes account of the sources in the external environment that naturally provide satisfaction for people; and then, after a series of subsequent motivations, desires, and actions, completes itself with sufficient bases for one's own satisfaction, including the satisfaction of one's own consciousness....

I

Among the laws under which human organisms live, the law of freedom stands in first place. According to this law, a person can set or fail to set his own goals....

Goal setting takes place in awareness. It is based on direct self-awareness, on one's conscience....

In his conscience, a human is aware of himself as a member of a greater unit, as a part of a greater whole, and at the same time as a self-contained unit among many, as a whole among other wholes.... Goals that express only the partial nature of a human and goals that express only the oneness of a human contradict his deepest, innermost self-awareness; they correspond to one part of his being but exclude the other, even though only both as a unity have human mental capacities....

A human finds the clarification of his being in the community along with ways to grow and transcend himself. He can find clarification if he seeks it; he finds clarification while being free....

II

A second law relates to unification and separation. This is not an independent law; it is immediately implied in the previously discussed law about mental capacities and freedom; it is the projection of this law from human awareness into the external environment....

The law of unification and separation works outward from some middle point in all directions, and from all these directions back again to the middle point. There are no effects from the outside to the inside; rather, all effects come from inside to outside. The total effect is therefore never destructive, never only spreading or separating, but always simultaneously combining, giving structure, a closed form within itself. Thus, parts are created yet unity prevails; hence, a unit is a unity and a part at the same time. Only thus are there reconciliation and harmony in all the directions that the effect takes in the space....

The desiring human interferes with natural relationships and causes both unity and separation with the power of his thought....

The strength of the unifying and separating spirit in human awareness and action depends on the purity, depth, and strength of man's conscience and on the extent of his total awareness and the wealth of its content based on knowledge from experience....

The purer, deeper, and stronger the conscience, the greater the extent and the abundance of total awareness. The more our knowledge is in agreement with external reality, the stronger will be the unifying form of our will, the greater, more extensive will be the communities that develop, and the greater and more valuable will be the technical equipment that man creates for himself and for his communities; also, the more complete will be the specialization that follows in the communities and the development of the main leadership position and other structural positions at different levels, on down to the individual members....

When attempts are made to establish communities in which the members have only indirect participation, compartmentalized structures are created that lack unifying power; there is no surprise when these communities collapse. When attempts are made to establish communities in which members are connected to a whole through direct contacts, a structure is created that is completely unifying; but because of a lack of structured parts, it is unable to act, and so must also fall apart if structured positions are not developed so that the unit has the possibility of being active and performing its tasks. Very small communities may, nevertheless, succeed through direct contact with the leadership position....

Task specialization is one of the most important facts of community life. It is one aspect of the form in which the community is realized; the other is work coordination. The two together define the form of life in a community....

Those who support task specialization without also enhancing the community regard people working in the organization as components of its technical apparatus without recognizing their mental capacities. This tears the human being out of his mental relationship and makes him a component of reason....

Professions are a consequence of task specialization in the community. If community development is held back and only technical task specialization is advanced, then the community is threatened with destruction. What is taken from the professions in this way is their intellectual content. But this is what they depend on: without such content, professions become mechanical.... However, the profession is the organic connection between the community and task specialization in individual humans, the organic connection between mental activity and events following from natural laws.... Professional beliefs dictate that no one can dominate relationships based on natural laws without being mentally free.... It is necessary that professions be at the center of education and instruction. Thus will one not just support understanding but also develop people....

Unification and separation — that is, design — are possible because in humanity each smallest unit has a conscience and a

spirit, and in nature each smallest part has power. Each of these smallest units and parts contains the whole and is therefore a whole and a component at the same time.

III

The third law relates to economic optimality. There are two common versions of this law:

1. With a fixed amount of resources, achieve the highest level of effectiveness.
2. Obtain a desired level of effectiveness with the least amount of resources.

The level of effectiveness cannot be higher than what is latently possible. From the latently available potential, nothing should be wasted; this is the meaning of the first version.

The minimal assignment of resources is achieved when no more has been expended to generate an intended effect than was necessary under the condition of full (potential) utilization. Emphasis is on the phrase "under the condition of full (potential) utilization," because in all other cases the least amount of resources has not been utilized.

Thus, the two versions are completely identical. The second version corresponds better to the goal activity of human beings, as it starts with goals and intended effects....

We know that the economic law of optimality deals with goals and intended effects, and that setting end goals and instrumental goals, if done humanistically, will express the conscience. That humanistic goal-setting should occur is an implicit requirement of the law of freedom....

If the reader analyzes the law of economic optimality very thoroughly, he will realize that it is a law of preservation.

Already when describing the law of unification and separation — that is, the law of design — I have mentioned aspects of economic optimality. All structuring that considers time is necessarily economical and based on the law of preservation.

Therefore, specialization, separation, and unification are determined not just by a law of design but also by a law of

preservation. This law of economic optimality is the law by which organisms (including human and social organisms) persist....

In his conscience man is immediately aware of the laws of design and preservation, because they form a unity.... That these laws are interdependent is also demonstrated by the fact that economic optimality is expressed in the notions of unification and separation. Unification leads to a single unit, not more; parts may exist — as many as are required for the existence of an organic unit.

In the external environment the law of freedom as projected in economic optimality is confronted with Robert Mayer's law of power preservation, which in an updated version says: "The universe's energy is constant." To illustrate this, let us use the organism of a business firm as an example. The value of all its goods and services must be returned to the company. If this occurs, then the energy within the business firm remains constant; if it does not occur, energy has either been transferred to or gained from other organizations, which then have more or less energy. But even in these cases the energy remains constant, only this time in the larger organism of which all business firms are a part, including the total universe.

For the transition of organisms from one state to another, the following holds: Energy must be in a fixed relationship to goals, which can be described as "sufficient" if the organism is to persist, live, and be effective. If the goals are too high, either they have to be trimmed and reformulated or the performance effectiveness of means has to be increased. If the energy is too great, then new goals have to be established for the excess energy, through which new organisms may ultimately develop, or, alternatively, the excess may be transferred to other organisms or the goal may be extended, whichever seems to be the more adequate.

When analyzing the law of preservation, the terms costs, exchange value, and profits also have to be discussed. They lead back to the notion of capital....

Goal achievement costs the exchange value of the goods

and services that are needed.... Exchange values are those services and goods that flow back into organizational domains in exchange for costs....

A profit is the exchange value given for the effects generated by an entrepreneur, who represents a community. Since he compensates his employees for their contributions at a time when sales values have not yet been determined, it is fair to grant him compensation for the risk he takes. He is entitled to receive interest for the use of his capital.

Should the profits be greater than the sum of these amounts, then a compensation of employees in the form of profit sharing is required....

The possibility of a loss is already compensated for through the premium for risk taking the entrepreneur has been granted. The enterprise must provide for the development of sufficient reserves, which, at appropriate times, must be taken from the profits. In this way the community also appears as a claimant for a share of the profits. When this procedure is followed, the organism remains pure and strong and will persist.

The capitalistic development of our society has linked the concept of profit to the concept of capital instead of linking it to the creative aspect of life, to the concept of work. This way of thinking has veiled what is basically correct in calculating profit contributions and has enabled the owner of capital to collect larger shares of the profit than they were entitled to. Not through the existence of capital, but solely because of this injustice, something has emerged that is called capitalism. It is time for a general revision of corporate laws, especially as they relate to the distribution of profits.

My remarks are not directed against private ownership of capital, but against the inequitable distribution of the total results among the participants....

With respect to the law of economic optimality, the organizing human being needs extensive knowledge of human nature (especially as it relates to the psychotechnical apparatus), profound insights into fixed natural relationships, and a large body of experience in order to intervene successfully in these relationships.

Int. Studies of Man. & Org., Vol. XI, No. 1, pp. 26-32
M. E. Sharpe, Inc., 1981

CONCEPTS AND FUNCTIONS OF ORGANIZATIONS

Erich Gutenberg (Federal Republic of Germany)

The orderliness in corporate affairs depends on consciously designed measures taken by human beings, who plan and organize. Planning means to design an order that prescribes the whole process of corporate activities. Organization refers to the execution, the implementation, of this order. Active implementation is the characteristic that distinguishes the phenomenon "organization."

The term organization can be interpreted in several ways. Organization can be defined as both the conceptualization and the realization of an order. Also, it is possible to include in a definition of organization the driving forces that shape and design an organizational structure. Defining the term organization in this broad way leads to the formula "Enterprise equals organization."

Such a broad conceptualization of the nature of organization

This article was first published as Chapter 6 (parts I and II) of Erich Gutenberg's Grundlagen der Betriebswirtschaftslehre. Erster Band. Die Produktion. (23rd, unchanged ed.) Berlin–Heidelberg–New York: Springer-Verlag, 1979. Pp. 234–58.
 The translation and abridgement are by Rudi K. Bresser and Roger L. M. Dunbar.

Dr. Erich Gutenberg is Professor Emeritus of Business Administration at the University of Cologne, Federal Republic of Germany.

is the basis for Bogdanow's (1926, 1928) theory. For him organization stands for the general forming and structuring principle of all natural and social activity. The conceptualizations of Plenge (1919) and Nicklisch (1922) also derive from such a broad definition of organization. They see organization as a somehow intrinsically productive force....

By contrast, the concept of organization adopted here is rather narrow, being restricted to those instruments and techniques by which a planned order is established. The advantage of such a narrow definition becomes clear if one considers that imperfections of the production process can be caused by faulty planning, insufficient organization, or management errors. If this be the case, then organization should be something other than planning or managing. Therefore, organization is seen here as a separate productive factor along with the other two managerial functions planning and directing. Organization is not the ultimately critical and structuring force of enterprise activities: it is merely the extended arm of management that provides support in the task of combining human resources, operational facilities, and raw materials into an effective unit.

The organization always has a serving or instrumental character. If one conceptualizes organization in this manner, one is protected from demanding achievements that cannot be expected. For example, an organization cannot be productive in the sense that it can generate new objectives, behavioral alternatives, or even new values for itself. This kind of productivity is necessarily restricted to those who use the organization in order to achieve their goals and plans. Organization simply represents the means to these ends. The more the corporate organization facilitates the accomplishment of operational goals and plans, the better it performs the task that is appropriate for its service-oriented and instrumental nature.

Because organization can be only a means to an end, never an end in itself, one should neither idealize nor condemn it. Organization cannot, and should not, be more than an instrument one uses to realize authorized corporate goals and orders....

The essential characteristic of organization is to make a

productive unit out of unrelated elements. The solution of this task presupposes that those entrusted with the organization's leadership and direction have the appropriate authority. This authority provides the possibility for determining the rules according to which the corporate process will proceed. Indeed, rules are the concrete content of organization, and may be more or less detailed....

There can be no doubt that whenever company activities are adjusted to an orderly structure, the discretion of employees to structure their work will be diminished. The one direction in which organizational regulations can move is characterized by the integration, to the extent possible, of the corporate coordination and direction process into a system of general rules (Henning, 1957; Nordsieck, 1961).

As more general rules are established, the opposite form of organizational measures, situation-specific rules, becomes less important. A choice always exists between making general or situation-specific rules for the regulation of organizational activities. For managers, general rules mean that decision-making discretion is reduced. For subordinates, rules mean loss of personal freedom on the job. The more general rules affect events, the more coordination and work functions become depersonalized. However, this tendency toward general rules is only one side of organizational measures. A second characteristic is that people who have authority should be left with as much discretion as possible to make situation-specific decisions. Individual discretion is broad and guaranteed by decision rules. In this case personal influence is most important in the system of corporate coordination and direction.

Both general and situation-specific rules are components of organization.... Everything that is subject to rules is, so far as it involves practical accomplishment, considered to be organized.

For subordinates, it is basically unimportant whether behavior is determined by general or situation-specific rules: both reduce decision-making discretion. From the subordinate's standpoint, decision-making discretion is increased as rules,

irrespective of their type, are reduced. On the other hand, management has the possibility of giving either general or situation-specific instructions....

Is there a principle that defines the conditions under which freer or more restrictive forms of organizational structuring should be preferred?

When observing corporate activities one can clearly see that there is a large number of processes that generally repeat themselves in the same or a similar way. Such situations... literally press for general regulations.

General rules prescribe certain forms of employee behavior and thus limit discretionary behavior. At the same time, the need for personal directions from those with authority becomes obsolete.... The general rule substitutes for the situation-specific rule and makes it superfluous. Whenever enterprise activities display a relatively high degree of homogeneity and repetitiveness, there is a tendency to replace situation-specific rules by general rules — in other words, the tendency to adopt general rules increases as the variability in corporate events decreases.

This proposition is referred to as the substitutional principle of organization. From this principle it follows that corporate direction increasingly loses its individual character as general rules are used to provide coordination. This loss appears to be justified, because organizational activities become characterized by their homogeneity, regularity, and simplicity. Under such conditions the organization becomes increasingly depersonalized.

Possibilities for substituting individual, situation-specific rules for general rules decrease as organizational events increase in complexity and become more transitory. For example, if supplier market conditions worsen because prices, delivery procedures, and qualities change considerably, a rule that restricts company purchases to a rigid organizational scheme ceases to be appropriate and advantageous. Freer structures that allow more individual decision-making discretion may be more appropriate in such cases. Individual rules

or ad hoc direction should replace the general regulatory scheme. But this is only a temporary arrangement, as all organizational departments should strive to replace uneconomical improvising by regulated activities as soon as possible. If there are internal or external events with a high degree of complexity, irregularity, and dissimilarity, so that they can be dealt with only by individual decisions, then an organizational solution has to provide for high degrees of authority and decision-making discretion. This more open design of organizational structure is not inconsistent with the concept of organization used here. According to the substitutional principle of organization, more general rules can be substituted for situation-specific rules only to the extent that the similarity in organizational events permits.

Maintaining a balance between the tendencies toward general regulations as opposed to situation-specific rules is a continually occurring organizational process. However, in large organizations there is a tendency toward a decrease in the functional and authority areas, and hence in [the amount of] discretion (but not in the responsibility areas), at hierarchically lower levels, and partly also at middle-management levels. In this sense the amount of authority decreases and so does the discretion for situation-specific, individual decisions....

A rule provides an unsatisfactory solution to an organizational task if it allows for more situation-specific regulation than is required. A correspondence between the organizational task and its solution is also lacking if the process of substitution has been carried beyond the point necessary for solution of a specific organizational problem....

For all organizational tasks there is an optimum between open and restricted structure. This optimum is determined by the substitutional principle of organization.

The Organizational Process

What are the characteristics of an organizational process that will result in a system for organizational direction that

has well-defined information flows and lines of authority?

The best reply to this question requires that one differentiate between object-related work and managerial services. Work within a company consists, on the one hand, of making-or-doing functions (Sachaufgaben) — task elements — and, on the other hand, of managerial functions (dispositive Aufgaben). Making and doing functions include an immense number of technical, commercial, financial, and acquisition activities that are heterogeneous in nature and directed toward an operational goal. They represent a heterogeneous continuum, each task element being unrelated to the other. This isolation is not eliminated until specific organizational measures are introduced that combine the task elements into a functioning unit. These task elements are the starting point for organizational efforts that define relationships among activities that do not exist naturally. Only when these task elements have been brought together in an organized structure can they contribute as corporate interests may require. It is the system of rules and regulations that ensures that operations can be effective.

Managerial functions consist primarily of planning, directing, and controlling activities. Preparation of specific work performance, allocation and distribution of tasks to departments or individuals, training for these activities, and their supervision form a catalogue of managerial functions. The test of a new technical procedure or the selection of a specific technique is an operational, not a managerial, decision....

Individuals can be responsible for both operational and managerial functions. In fact, almost all authority positions in an organizational hierarchy entail both operational and managerial functions. It is very doubtful that there is an increase in the number of managerial activities performed as one moves from the bottom to the top in an organizational hierarchy.

Thus, the organizational procedure consists basically of establishing facilities and regulations that allow all commercial and technical activities or decisions to be coordinated with all managerial functions or decisions directed toward satisfying the overall corporate interest. This is the meaning and the

function of the organizational process....

References

Bogdanow, A. (1926 and 1928) Allgemeine Organisationslehre. Vols. I and II. Leipzig and Berlin: Organisation Verlags Gesellschaft.

Hennig, K. W. (1919) Betriebswirtschaftliche Organisationslehre. (3rd ed.) Berlin–Göttingen–Heidelberg: Springer.

Nicklisch, H. (1922) Der Weg Aufwärts! Organisation. (2nd ed.) Stuttgart: Poeschel.

Nordsieck, F. (1961) Betriebsorganisation, Lehre und Technik. 2 Vols. Stuttgart: Poeschel.

Plenge, J. (1919) Drei Vorlesungen über die allgemeine Organisationslehre. Essen: Baedeker.

Int. Studies of Man. & Org., Vol. XI, No. 1, pp. 33-55
M. E. Sharpe, Inc., 1981

THE ROLE OF TRANSITIVITY IN DECISION THEORY

Bernd Schauenberg (Federal Republic of Germany)

Three decades of intensive scientific discussion since the first appearance of the path-breaking work on game theory by Neumann and Morgenstern (1944) have led to many new insights concerning human decision-making. In spite of this, there is today a series of important basic problems in decision theory that have not been fully discussed. The role of the transitivity assumption belongs to this group, as the following quotation indicates:

> Transitivity, though still a controversial property of decisions, is prescriptively absolutely necessary, a precept of rationality or even of logic. Those who prefer a_1 to a_2 and a_2 to a_3, should rationally or logically also prefer a_1 to a_3. But empirically, transi-

---

This article, "Zur Bedeutung der Transitivitätsvoraussetzung in der Entscheidungstheorie," was first published in Zeitschrift für die gesamte Staatswissenschaft, 1978, 134, 166–87. It has been abridged and translated by Roger L. M. Dunbar and Rudi K. Bresser, and is reprinted here with the permission of the publisher, J. C. B. Mohr (Paul Siebeck), Tübingen.

Dr. Bernd Schauenberg is a Research Fellow (Hochschulassistent) at the Fachbereich Ökonomie, Johann Wolfgang Goethe University, Frankfurt/Main, Federal Republic of Germany.

> tivity is not necessarily a given, and in fact, many studies have shown that in practice the transitivity assumption is often violated. (Menges, 1969. Preface, p. 6)

Here, Menges distinguishes between logical, empirical, and prescriptive areas of decision theory. These distinctions are maintained in the following discussion of three questions.

1. Is transitivity really a "precept of logic," or is it possible to specify theoretical concepts of "rationality" in a logical analysis without assuming transitivity?
2. Have empirical investigations really shown that general reservations about the transitivity assumption are appropriate, or have they shown that these reservations are appropriate only under quite specific conditions? If so, under which conditions?
3. Is transitivity really "prescriptively absolutely necessary," or is this statement valid only under some, but not all, possible sets of conditions?....

There are differences in the goals of knowledge production and in the evaluative criteria used in the three areas. In logical decision theory, explication of a theoretical concept of "rationality" is the critical issue. From axioms and definitions, consequences are derived through deductive procedures. If the transitivity assumption is used, then this is neither an attempt to describe real decision behavior (descriptive interpretation) nor a rule for reasonable behavior (prescriptive interpretation). With respect to evaluation, the rules of logic are the ultimate authority.

In empirical (descriptive) work, the search for laws or general regularities in human decision behavior is the critical issue. Research can investigate whether actual decision behavior is in agreement with the transitivity assumption. With respect to evaluation, the usual rules for empirical social research are the ultimate authority.

In prescriptive work the aim is to recommend reasonable behavior that decision makers should follow in particular sit-

uations.... To provide such advice, logical as well as empirical insights must be used. This indicates that in order to evaluate prescriptions, no comparable ultimate authority exists as in logical and empirical work. Advice for a decision maker that may be useful in one particular decision situation may be useless in another.

The purpose of the present paper is to show that:

1. The transitivity assumption is not necessary for every theoretical concept of rationality, and is therefore not a "precept of logic."
2. In empirical investigations, it is only under quite specific conditions that intransitivity can be accepted as having been demonstrated.
3. In light of these results, it is not always reasonable for a decision maker to determine transitive preference relations.

Preference Orderings and Choice Functions: The Place of Transitivity in Decision Logic*

The usual starting point for investigations in formally oriented decision theory is the specification of a binary relation R over a set A of all possible (all imaginable) alternatives. In what follows, only a few important basic ideas and results will be discussed so far as they relate to the transitivity assumption.... This notation will be used: xRy means "x is at least as good as y." Therefore, if nothing further is required, R describes the weak preference relation. The strong preference relation, P, and the indifference relation, I, are simply defined as follows:

$$xPy \longleftrightarrow xRy \wedge \sim(yRx), \text{ and}$$
$$xIy \longleftrightarrow xRy \wedge yRx.$$

*Glossary of symbols used here: I = identity; P = preference; ε = is an element of; $\forall x$ = for all x; $\longrightarrow$ = implies; $\wedge$ = and; $\vee$ = or; $\sim$ = not; $\subset$ = is a subset of. — Eds.

If R is reflexive ($\forall x \in A: xRx$) and transitive ($\forall x,y,z \in A: xRy \wedge yRz \rightarrow xRz$), then R is a quasi-ordering. If R is in addition also complete ($\forall x,y \in A: (x \neq y) \rightarrow xRY \vee yRx$), then R is a (weak) preference ordering.

With these concepts one can carry out a first logical analysis. For example, one can show the consequences of dispensing with completeness by comparing the characteristics of a preference ordering and a quasi-ordering. To treat more serious problems, we follow Sen (1969, 1970) and derive a few definitions. With B, we indicate finite subsets of a not necessarily finite set A.

> Definition 1: An alternative $x \in B$ is called the best alternative in B relative to R, if and only if $\forall y: y \in B \rightarrow xRy$.
>
> Definition 2: The set of all best alternatives in B relative to R is called the choice set of B and is described as W(B, R).
>
> Definition 3: A choice function W(B, R) over A is a function that determines a nonempty choice set for every finite and nonempty subset B of A.

Best alternatives in a set B, according to a specified preference relation R, have the property of being at least as good as all other alternatives in B. In the sense of definition 2, choice sets can:

> — Case 1, be empty, as the following example shows: $\sim(xRy) \wedge \sim(yRx)$ with $B = \{x, y\}$.
>
> — Case 2, contain only one element, as can be seen in the example xPy with $B = \{x, y\}$.
>
> — Case 3, include several elements, as the following example shows: $B = \{x, y, z\}$ and xIy, xPz, yPz. Here, obviously, $x, y \in W(\{x, y, z\}, R)$.

According to definition 3, choice functions must provide a nonempty choice set for all nonempty, finite subsets B of A.

But because choice sets can be empty (case 1), choice functions may not exist. Our problem is to determine under what circumstances a choice function exists.

Case 1 shows the relevance of the completeness property for the existence of a choice set. If a relation over a set is not complete, then a choice set may not exist for every subset. The same problem arises when the reflexivity property does not hold (Sen, 1970. P. 14). The relevance of the transitivity assumption for the existence of a choice function is made clear in the following theorem (Schauenberg, 1978. P. 27):

> Theorem 1: If R is a weak preference ordering, there is a choice function W(B, R).

That is, if one disregards reflexivity and completeness for a moment, the transitivity of a binary relation is a sufficient condition for the existence of a choice function. But, the transitivity assumption is not a necessary condition, as can be seen in the following example:

> Let $B = \{x, y, z\}$ and $xPy \wedge yPz \wedge xIz$.

Here, the transitivity assumption does not hold. However, $\{x\} = W(\{x, y, z\}, R)$, showing that a choice set may exist when R is not transitive.

In preparation for discussing further conditions for the existence of a choice set, additional properties of binary relations are now introduced.

> Definition 4: A binary relation R is called quasi-transitive if for all x, y, and z in A, $xPy \wedge yPz \longrightarrow xPz$.

Sen (1969. P. 382) proved a theorem concerning the relation among transitivity, quasi-transitivity, and other properties.

> Theorem 2: If R is a quasi-ordering over a

set B, then for all x, y, z in B:

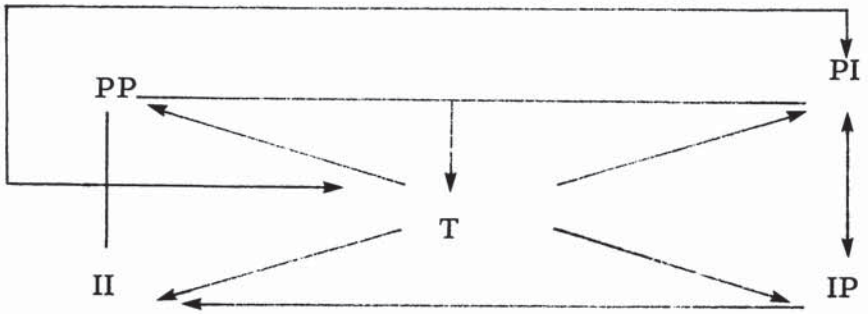
(a) $xPy \wedge yPz \longrightarrow xPz$
(b) $xPy \wedge yIz \longrightarrow xPz$
(c) $xIy \wedge yPz \longrightarrow xPz$
(d) $xIy \wedge yIz \longrightarrow xIz$.

The property established in theorem 2(a) will be labeled PP; the property in theorem 2(b), PI; that in theorem 2(c), IP; and that in theorem 2(d), II. The PP property is identical with the quasi-transitivity property established by definition 4. Hence, in accordance with theorem 2(a), quasi-transitivity can be deduced from transitivity. In the future, the transitive property will be indicated by the symbol T. Further theorems about quasi-transitivity and other properties referred to in theorem 2 were proven by, among others, Schauenberg (1978), and are summarized in the following theorem.

Theorem 3: If R is reflexive and complete, the following holds:

(a) $T \longrightarrow PP$, PI, IP, and II.
(b) PP is independent of PI, IP, and II.
(c) $PI \longleftrightarrow IP$
(d) $PI \longrightarrow II$
(e) $PP \wedge II \longrightarrow PI$
(f) $PP \wedge PI \longrightarrow T$.

From the propositions established in theorem 3, the following can be derived: $IP \longrightarrow II$ and $PP \wedge II \longrightarrow T$. All relations among the different concepts are summarized in the following figure, in which the arrows indicate proven implications.



The figure shows that quasi-transitivity (the PP property) is largely independent of other properties. Admittedly, quasi-transitivity follows from the transitivity property. But if one starts by presupposing only the quasi-transitivity property, then at least one of the other properties must hold in order to establish the full transitivity property.

This relative independence of the weaker quasi-transitivity property in comparison with the transitivity property (see theorem 2[a]) is especially important for determining the existence of choice functions. Above it has been shown that transitivity is indeed a sufficient, but not a necessary, assumption for the existence of a choice function. From the results discussed, we know that quasi-transitivity is related to transitivity, but is not an identical property. The relation between quasi-transitivity and the existence of a choice function is demonstrated by the following result by Sen (1969. P. 383):

> Theorem 4: If R is a complete, reflexive, and quasi-transitive relation, then a choice function W(B, R) exists.

Quasi-transitivity is likewise a sufficient condition for the existence of a choice function. This can be demonstrated by referring to the example presented in conjunction with theorem 1. There, xPy, yPz, and xIz were true, which contradicted the definition of quasi-transitivity. Nevertheless, the choice set $W(\{x, y, z\}, R)$ was not empty. To proceed, we need a further property:

> Definition 5: A binary relation R is acyclical over A when for all x_i ($i = 1, 2, 3. . . . , n$) in A, the following holds: $x_1 P x_2 \wedge x_2 P x_3 \wedge . . . . \wedge x_{n-1} P x_n \dashrightarrow x_1 R x_n$.

As opposed to transitivity and quasi-transitivity, acyclicity is not defined over triples of alternatives. It is possible that a relation is acyclical over all triples from a set of four alternatives, but violates the acyclical property for the set as a

whole. An example is the following: Let n=4 and $x_1Px_2, x_2Px_3, x_3Px_4, x_4Px_1, x_1Ix_3, x_2Ix_4$. Moreover, quasi-transitivity of a binary relation implies acyclicity, for if $x_1Px_2 \wedge x_2Px_3 \wedge x_3Px_1$ is possible, acyclicity is violated. But this is also a violation of quasi-transitivity, which proves the point.

Now, with the help of the acyclical property, it is possible to specify an additional theorem, also proven by Sen (1970. P. 16), that contains the necessary and sufficient conditions for the existence of a choice function.

> Theorem 5: If R is reflexive and complete, then acyclicity of R is necessary and sufficient for a choice function W(B, R) to exist.

With theorems 1, 4, and 5, three assumptions referring to a preference relation have been established that imply the existence of a choice function. If one disregards the general assumptions of reflexivity and completeness, then these are the transitivity, quasi-transitivity, and acyclic assumptions. These three assumptions are not independent of one another. Acyclicity follows from quasi-transitivity, and through quasi-transitivity from transitivity. All three assumptions are sufficient. Only the weakest of the sufficient assumptions — the acyclical property — is also necessary. Hence, neither transitivity nor quasi-transitivity is "absolutely necessary," in Menges's sense, for a choice function to exist. Thus, transitivity is not a logically necessary requirement. The first hypothesis is therefore confirmed.

Further problems are raised if additional properties associated with the existence of choice functions are explored. In the literature (Arrow, 1959; Chernoff, 1954; Sen, 1969, 1971, 1973; Suzumara, 1976), several conditions have been proposed and investigated, and two are introduced here (Sen, 1969. P. 384):

> Condition 1: For all x, the following holds:
> $$x \varepsilon B_1 \subset B_2 \rightarrow \{x \varepsilon W(B_2) \rightarrow x \varepsilon W(B_1)\}$$
> Condition 2: For all x and y, the following holds:

$$\{x,y\varepsilon W(B_1)\wedge B_1\subset B_2\}\rightarrow\{x\varepsilon W(B_2)\leftrightarrow y\varepsilon W(B_2)\}$$

Condition 1 requires that a best element in a larger set must also be a best element in a subset if it is in this subset. Condition 2 requires that given two best elements in B_1, a subset of B_2, if one element is also a best element in B_2, then the other element must also be a best element in B_2. Now, the following theorems hold:

> Theorem 6: A choice function generated by a binary relation R meets condition 1, but not necessarily condition 2.
>
> Theorem 7: A choice function generated by a binary relation R meets condition 2 if, and only if, R is a weak preference ordering.

According to theorem 6, condition 1 is fulfilled if a choice function exists. If a choice function is also supposed to fulfill condition 2, then it must have been derived from a weak preference ordering. In that case, the assumption implies that the corresponding relation R is also transitive.

To summarize: In the results discussed here, we have demonstrated that studies of logical decision theory employ at least two theoretical concepts of rationality. The first concept is focused exclusively on the existence of choice functions. In this case neither transitivity nor quasi-transitivity is necessary. The transitivity requirement of the indifference relation (II property) can be ignored. And this concept is not in conflict with condition 1. The second concept has to be derived from condition 2, and here transitivity is necessary. In logical analyses, the conflict between these two concepts cannot be resolved. But because only the second concept implies transitivity, our argument remains intact.

Empirical Findings about Transitive and Intransitive Decision Behavior

...There are problems in finding appropriate operationaliza-

tions that empirically measure the existence of preference relations. Davidson and co-workers (1955. P. 147) proposed that a preference relation be regarded as a theoretical concept concerning human dispositions and that empirical findings about subjects' behavior in experiments be regarded as "evidence for the disposition, but not identical with it." This position allows neither a dogmatic treatment of logical concepts nor a dogmatic regard for empirical findings. The evaluation of empirical results will not be able to lead to clear consequences and conclusions; at best, it will show possible implications of logical decision concepts and assumptions for practical use.

Fifteen investigations are discussed that are either directly or indirectly related to the empirical relevance of the transitivity assumption. Many of these studies originate from two experiments conducted by May (1954) and Papandreou (1957).

May (1954) argued that conflicting but equally weighted evaluation criteria could be a cause of intransitive preference relations. His experiment had 62 student subjects who were faced with three hypothetical marriage candidates, x, y, and z. These alternatives were distinguished by their wealth, beauty, and intelligence, as described in the following table:

	Criteria		
Rank	Beauty	Wealth	Intelligence
1	y	z	x
2	z	x	y
3	x	y	z

During the course of the experiment, the subjects had to announce their preferences for all pairs of alternatives, and indifference was not permitted. Seventeen of the 62 subjects — 27.4 percent — had an intransitive preference relation of the form xPyPzPx. Therefore, given conflicting evaluation criteria, a first conclusion would be that intransitivity cannot be excluded. Questions have been raised, however, about this astoundingly high proportion of intransitive preferences. The

subjects' task was scarcely realistic, and there were no consequences attached to their decisions. In addition, the elimination of indifference proved disadvantageous in the following way: Each person who was indifferent to the three alternatives was forced to choose randomly an alternative from a particular pair. There is a probability of 0.25 that such a person would report an intransitive preference relation. Because such a behavioral pattern cannot be excluded, some, if not all, the intransitive preference relations in May's experiment may be attributed to the experimental design.

Papandreou (1957) gave subjects a selection of tickets to five sporting and five cultural events.... Subjects were not paid, but they were permitted to express indifference. The tasks were presented to the subjects at different times. It was found that the proportion of intransitive preference relations was approximately 5 percent and thus clearly smaller than in the experiment by May. (1) One can only speculate in trying to explain this divergence. Two effects may have made transitive preference relations more likely: on the one hand, the fact that Papandreou permitted the indifference choice, and on the other hand, the possibility that subjects had strong preferences for one of the two types of events.

Comparing the approach, method, and findings of the studies by May and Papandreou, which have been used as a reference point for many subsequent investigations, one must conclude that the existence of intransitive preferences is confirmed by these studies. This finding is also supported in experiments by Flood (1951) and Edwards (1953), although the transitivity hypothesis was not their prime focus.

Moreover, it is likely that the number of intransitive preference relations increases when the subjects' tasks require the evaluation of conflicting criteria. This assumption is supported not only by a comparison of the findings obtained by May and Papandreou but also by Edwards's results.

The larger proportion of intransitive preference relations has occurred only in the studies of May and Edwards, in which the indifference choice was not permitted. Undoubtedly, one

must regard these reported proportions as too high because of their methodological dependence. Nevertheless, on this basis one cannot question whether intransitive preferences exist.

Let me now report on a series of experiments that follow from the studies just discussed, although in a number of cases the questions explored are only indirectly related to the first experiments. For example, this holds for Rose (1957) and Davis (1958), who both assumed that the proportions of intransitive preferences found in the first experiments were generally too high. They also assumed that one can accept empirical proof of intransitive preference relations only if they can be shown to be stable. They regard an intransitive preference relation to be stable if the same subject makes the same choice among the same alternatives at two different times. Both investigators found large numbers of intransitive preferences; but also in both studies, the number of stable intransitive relations was quite small. This is, of course, no argument against the existence of intransitive preference relations.

In five further experiments — by Chipman (1960), Coombs and Pruitt (1960), Davidson and Marschak (1962), Griswold and Luce (1962), and Slovic et al. (1965) — the validity of assuming stochastic transitivity is investigated in experiments with betting alternatives. In all five, violations of the (algebraic) transitivity assumption were found. With the exception of that of Slovic and co-workers (1965), all the studies report that the strong stochastic transitivity assumption was often violated; but in no study were there frequent violations of the weak stochastic transitivity assumption. Therefore, weak stochastic transitivity should be considered confirmed by these studies.

Weinstein (1968) argued that it was costly for a decision maker to establish an individual preference ordering, and that for a rational decision-maker, these costs should not be greater than the expected utility gain from having the preference ordering. In addition, he argued that the ability to define a preference ordering was learnable. If these assumptions held, then, he reasoned, the cost of defining a preference ordering should

reduce with increased experience. Therefore, older people should more often have transitive preference relations. The study, using 152 subjects from four age groups, showed that older subjects clearly had fewer intransitive preference relations than very young subjects. Whether this finding is to be explained on the basis of the cost argument mentioned above remains open, because this conclusion cannot be related to the published data provided by Weinstein.

A similar question was investigated by Leinhardt (1973), who evaluated 136 sociometric studies that had been carried out by the Institute of Child Studies at the University of Toronto over a 14-year period. Subjects were groups of children from kindergartens and schools, their average age varying between 3 and 10 years, and the average group size, between 12 and 22. All the groups had been together for a relatively long time, so it can be assumed that the effects of established interpersonal relations would be represented in these groups. There was a considerable number of transitive relations in all groups, and the proportion increased with age. This finding cannot be compared directly with the other conclusions discussed here. Indirectly, the study shows that at least during the development of interpersonal relations among children, transitivity is "learned."

MacCrimmon (1968) reported findings similar to those of Weinstein. He carried out three tests of the transitivity assumption with 38 experienced and successful managers. Seven percent (8 of 114) intransitive preferences were found. Follow-up inquiries disclosed that in six of the eight cases, subjects attributed their intransitive preferences to "mistakes" and a lack of care and wanted to change them. Only in two cases did subjects defend their position by referring to different dimensions of the decision problem and to the time of the questioning. These subjects could not be "convinced" or "made unsure" by discussion.

Tversky (1969. P. 31) wanted to show that very special experimental conditions can create consistent and predictable intransitive relations. He assumed that with an appropriate

experimental design, the weak stochastic transitivity assumption would have to be violated. He intended to investigate the cause rather than the existence of intransitive preference relations.

Tversky used the following example: A decision maker must choose among alternatives x, y, and z, which have been evaluated using the criteria K_1 and K_2:

	K_1	K_2
x	2 Δ	6 Δ
y	3 Δ	4 Δ
z	4 Δ	2 Δ

The decision maker is assumed to have the following decision rule, based on the idea of a lexicographic semiordering (LSO) (Luce, 1956): If the difference between two alternatives according to criterion K_1 is greater than Δ, then he chooses the favorable alternative according to K_1. If the difference is smaller or the same as Δ, then he chooses the alternative that has the greater value according to K_2. The use of this decision rule leads, in the above example, to an intransitive preference relation: xPy and yPz but also zPx.

Tversky (1969. P. 32) assumes that one cannot exclude the possibility that the decision maker uses such a decision rule. "Such a decision rule is particularly appealing whenever the relevant dimension is noisy as a consequence of imperfect discrimination or unreliability of available information." His argument is that if one creates experimental conditions such that subjects have to accept decision rules like those described above, because of a lack of other rules, then violations of weak stochastic transitivity are to be expected.

In the first of Tversky's experiments, a design was chosen that oriented subjects toward an LSO. The alternatives were the following five bets...:

Bet	Probability of winning	Winnings	Expected value
a	7/24	5.00	1.46
b	8/24	4.75	1.58
c	9/24	4.50	1.69
d	10/24	4.25	1.77
e	11/24	4.00	1.83

These bets were presented to subjects on cards on which there was a circle divided into a black and a white section, the black sector representing the probability of winning. In addition, a symbol identifying the bet and the potential winnings were written on the cards. This form of presentation of the bets made their evaluation very difficult for the subjects.

In preparing this experimental design, Tversky assumed that in choosing between two contiguous bets, the subjects would orient their choices toward the potential winnings: $p(a, b)$, $p(b, c)$, $p(c, d)$, $p(d, e) > 1/2$. In choosing between two bets with a large difference in probability — for example, between a and e — the subjects would orient their choices toward the probability of winning: $p(e, a) > 1/2$. Following such a decision rule leads inevitably to intransitive preference relations and even to violations of the weak stochastic transitivity assumption. The empirical results from a study of 18 students were clear: most of their statements violated the assumption of weak stochastic transitivity, but they were compatible with an assumption of an LSO. This was confirmed by the subjects' observations in this experiment and in additional control experiments. Therefore, the appearance of intransitivity could not be interpreted as a consequence of random decision procedures.

In comparing Tversky's experiments with other experiments, consideration must be given to Tversky's special goals. He did not want to determine whether intransitive preference relations exist or not; rather, he wanted to find out under which conditions intransitive preference relations might appear. As a theoretical basis for achieving this objective, the concept of

an LSO was used. The structuring and the processing of the experiments are based on these theoretical considerations....

Tversky's experiments suggest that intransitivity is predictable, given three essential assumptions. First, the alternatives must have several properties, so that the decision problem is multidimensional. Second, the differences among the separate alternatives must be very small (with visually presented success probabilities, they were scarcely perceptible). Third, in evaluating the alternatives according to the various criteria, there must be severe conflicts. The rank order of the bets, according to the probability-of-success criterion, was the exact inverse of the winnings criterion.

Under these assumptions, a subject relying on an LSO may adopt an intransitive preference relation. Under other assumptions this would not be expected.... If a decision maker, for example, (a) has a sensitivity threshold of $\Delta < 1$, or (b) the rank order of the criteria K_1 and K_2 changes, or (c) the values of the alternatives a and c according to criterion K_2 change, then in all three cases an orientation toward an LSO will probably lead to a transitive preference relation.

If, with these considerations in mind, the implications of Tversky's findings are assessed, one can only say that subjects who rely on LSOs for solving multidimensional decision problems will get themselves into difficulties such as those described above if, in addition, their task has the properties listed above. It is not shown that subjects always have an LSO or that relying on an LSO will lead to intransitive preference relations in other tasks. In other words, although Tversky's informative empirical results are very exact, their relevance is difficult to evaluate because no information is available about the relevance of the assumptions that lead to these results. Also, Tversky's (1969. Pp. 40–44) demonstration that reliance on an additive utility model or on an additive utility differences model, which can lead to intransitive preference relations for similar reasons as with a reliance on an LSO, does not help answer the question concerning the relevance of the assumptions. This demonstration shows only that there

may be still other, sometimes more general, assumptions under which intransitive preferences may occur. The empirical question about the relevance of the assumptions of such an argument is not dealt with, and cannot be dealt with. One must agree with Tversky's cautious evaluation of the relevance of empirical demonstrations of intransitive preference relations.

Summarizing, we may conclude that in light of the investigations discussed, the existence of intransitive preference relations can be accepted. This conclusion holds despite the methodological issues that have been raised. How large the proportion of intransitive preference relations is, remains unclear. It can be accepted that factors such as the structuring and processing of experiments, the traits of the subjects, and so on, influence the proportion of intransitive preference relations. The current state of research does not allow any clear assessment about the type and extent of these influences.

Whenever convincing demonstrations of intransitive preference relations have been found, the decision problem was always multidimensional. Hence, multidimensional decision problems seem to be a necessary condition for such demonstrations. Further, in these investigations decision procedures leading to intransitivity could be "explained" by plausible decision rules. Thus, it has been shown that intransitivity occurs not in all imaginable, but only under special, identifiable, conditions. This confirms the second hypothesis.

In addition, the influence of socialization factors and subjects' experience and learning procedures seem to be important. Also important are the results of ex-post-questioning of subjects who had intransitive preference relations, as was done, for example, by Tversky and MacCrimmon. They found that most subjects whose decisions had led to intransitivities described their choices as mistakes resulting from, for example, inadequate attention, and they were ready to revise their decisions.

Finally, it should be mentioned that in the studies discussed, only transitivity, not other properties of binary relations, were primarily investigated. In some cases — for example, Rose (1957) — the transitivity of the indifference relations has been

investigated and been determined to be especially problematic. But the question as to whether the empirical results can also be used against quasi-transitivity or acyclic relations is very difficult to answer. On the one hand, this is because of the difficulties mentioned in the beginning concerning the operationalization of the preference concept and, on the other hand, because in some studies indifference is not permitted, and the results of the investigations are quite inaccurately described. One can assume that in some studies (for example, those by May and Tversky) violations against quasi-transitivity and acyclic relations occurred. More exact assessments are not possible.

Consequences for Prescriptive Decision Theory

... Prescription requires that the assumptions on which recommendations are based be listed. In prescriptive decision theory, assumptions about the formal structures of the elements of the decision problem (for example, the mathematical characteristics of goal functions) are referred to as normative components; assumptions about goal content, the ability of the decision maker, and the decision situation are referred to as the empirical component. Derivations of procedural recommendations based on the normative and empirical components are referred to as the deductive component. The evaluation criterion for prescriptions is their (potential) contribution to improving decision behavior.

From this characterization it follows that both logical and empirical considerations are relevant for prescriptive decision theory. However, what consequences the results from the studies discussed above should have for prescriptive decision theory is a very complex question. We start by examining which conclusions cannot be supported....

Specific requirements from logical decision theory are not necessarily components of prescriptive decision theory. This follows, first, because the usefulness of recommendations cannot be reduced to the logical truth of theorems.... This con-

clusion also follows directly from our results concerning the implications of the transitivity assumption for decision logic.... A logical analysis alone can only indicate, not solve, the decision problem between a definition of rationality depending exclusively on the existence of a choice function based on condition 1, which requires acyclic but not transitive relations, and the definition of rationality based on condition 2, which also requires transitivity. When, however, as is shown here for a definition of rationality, and by Gäfgen (1974. Pp. 483–85) for other problems, decision logic specifies several concepts,... then a logical basis for prescriptive relevance is not possible because it is not clear for what situation a prescription is needed.

Analogously, the prescriptive relevance or irrelevance of results from empirical decision theory cannot be conclusively established. This follows, first, because usefulness cannot be reduced to empirical validity. Further, an adaptation of the normative components of prescriptive decision theory to empirical results would require that the claim of prescriptive theory to contribute the improvements in decision behavior be waived. That this waiver is not necessary is shown in the empirical studies of MacCrimmon (1968. Pp. 20–22) and Tversky (1969. Pp. 36–40): subjects confronted with their intransitive statements described their behavior as a mistake and were ready to correct it.

Further, a general waiver of the transitivity assumption is not justifiable because the empirical evidence for intransitive decision behavior was found only under quite specific rather than under all possible conditions. For example, no experiment ever showed that a subject had an intransitive preference relation if specific sums of money were attached to the alternatives to be evaluated. It was also never shown that in order to purchase a good A, a subject was prepared to pay more money than for B, for B more than for C, and also was ready to pay more for C than for A. In such a situation, violation of the transitivity assumption would have drastic effects. If such subjects did not change their preference structure, they would

lose their total fortune without achieving the slightest advantage (Burros, 1974; Davidson et al., 1955. P. 146; Raiffa, 1973. Pp. 99–100)....

Now the last point: it is not always reasonable to maintain a transitive preference relation. For example, assume that a decision maker is in a situation like Tversky's experimental subjects. If one recommended to this decision maker that he or she establish a transitive preference ordering after considering all relevant alternative properties, then this decision maker would have to solve a very complicated information-processing and -evaluation problem. We also assume that costs (for example, opportunity costs of time) arise for the decision maker. The possible returns for these costs can be calculated in Tversky's experiment, for example, as the difference in expected value of two contiguous bets ($E(b) - E(a) = 0.12$; $E(c) - E(b) = 0.11$; $E(d) - E(c) = 0.08$; $E(e) - E(d) = 0.06$). It can be reasonably assumed that the differences scarcely outweigh the efforts of an exact information creation and processing. If this assumption is true, then our decision maker will be at a disadvantage if he follows the recommendation to establish a transitive preference ordering. This confirms the last hypothesis. It is not always reasonable to establish a transitive preference relation.

The main reason for this third argument is the fact that intransitive preference relations are situation dependent: they are appropriate under some, but certainly not under all, conditions. For a long time similar statements have applied in prescriptive decision theory for deductive and empirical components of recommendations. Our third argument is that the validity of normative components in prescriptive decision theory also cannot be decided independently of the situation.

Note

1) Besides presenting subjects with the same alternatives several times for evaluation, Papandreou has also investigated the relative frequencies of the preferences (= stochastic prefer-

ences). $p(x, y)$ is the probability (relative frequency) with which a subject prefers x, given the choice x and y. It follows that $0 \leq p(x, y) \leq 1$ and $p(x, y) + p(y, x) = 1$. In the literature (for example, Davidson and Marschak, 1962. P. 240; and Coombs et al., 1975. Pp. 178–95), three stochastic transitivity assumptions are proposed and explored: Weak stochastic transitivity refers to the property $p(x, y) \geq 1/2 \wedge p(x, z) \geq 1/2 \rightarrow p(x, z) \geq 1/2$; moderate stochastic transitivity, to the property $p(x, y) \geq 1/2 \wedge p(y, z) \geq 1/2 \rightarrow p(x, z) \geq \min [p(x, y), p(y, z)]$; and strong stochastic transitivity, to the property $p(x, y) \geq 1/2 \wedge p(y, z) \geq 1/2 \rightarrow p(x, y) \geq \max [p(x, y), p(y, z)]$. Papandreou did not violate the strong stochastic transitivity assumption.

References

Arrow, K. J. (1959) "Rational Choice Functions and Orderings." Economica, 26, 121–27.

Burros, R. H. (1974) "Axiomatic Analysis of Non-Transitivity of Preference and of Indifference." Theory and Decision, 5, 185–204.

Chernoff, H. (1954) "Rational Selection of Decision Functions." Econometrica, 22, 422–43.

Chipman, J. S. (1960) "Stochastic Choice and Subjective Probability." In D. Willner (Ed.), Decisions, Values and Groups. New York: Pergamon Press. Vol. 1, pp. 70–95.

Coombs, C. H., and Pruitt, D. G. (1960) "Components of Risk in Decision Making: Probability and Variance Preferences." Journal of Experimental Psychology, 60, 265–77.

Davidson, D., and Marschak, J. (1962) "Experimental Tests of a Stochastic Decision Theory." In C. W. Churchman and P. Ratoosh (Eds.), Measurement: Definitions and Theories. (2nd ed.) New York: Wiley. Pp. 233–69.

Davidson, D., McKinsey, J. C. C., and Suppes, P. (1955) "Outlines of a Formal Theory of Value." Philosophy of Science, 22, 140–60.

Davis, J. M. (1958) "The Transitivity of Preferences." Behavioral Science, 3, 26–33.

Edwards, W. (1953) "Probability Preferences in Gambling." The American Journal of Psychology, 66, 349–64.

Flood, M. M. (1951) A Preference Experiment. Santa Monica, Calif.: The Rand Corporation. P-256, Nov. 13, 1951, and P-258, Dec. 5, 1951.

Gäfgen, G. (1974) Theorie der wirtschaftlichen Entscheidung. (3rd ed.) Tübingen: Mohr.

Griswold, B. J., and Luce, R. D. (1962) "Choices among Uncertain Outcomes: A Test of a Decomposition and Two Assumptions of Transitivity." The American Journal of Psychology, 75, 35–44.

Leinhardt, S. (1973) "The Development of Transitive Structure in Children's Interpersonal Relations." Behavioral Science, 18, 260–71.

Luce, R. D. (1956) "Semiorders and a Theory of Utility Discrimination." Econometrica, 24, 178–91.

MacCrimmon, K. R. (1968) "Descriptive and Normative Implications of the Decision Theory Postulates." In K. Borch and J. Mossin (Eds.), Risk and Uncertainty. London: Macmillan. Pp. 3–23.

May, K. O. (1954) "Intransitivity, Utility and the Aggregation of Preference Patterns." Econometrica, 22, 1–13.

Menges, G. (1969) Grundmodelle wirtschaftlicher Entscheidungen. Cologne and Opladen: Westdeutscher Verlag.

Neumann, J. V., and Morgenstern, O. (1944) Theory of Games and Economic Behavior. Princeton: Princeton University Press.

Papandreou, A. G. (1957) "A Test of a Stochastic Theory of Choice." University of California Publications in Economics, 16, 1–8.

Raiffa, H. (1973) Einführung in die Entscheidungstheorie. Munich and Vienna: Oldenbourg.

Rose, A. M. (1957) "A Study of Irrational Judgements." Journal of Political Economy, 65, 394–402.

Schauenberg, B. (1978) Zur Logik kollektiver Entscheidungen. Wiesbaden: Gabler.

Sen, A. K. (1969) "Quasi-Transitivity, Rational Choice and Col-

lective Decisions." The Review of Economic Studies, 36, 381–93.

Sen, A. K. (1970) Collective Choice and Social Welfare. San Francisco: Holden-Day.

Sen, A. K. (1971) "Choice Functions and Revealed Preference." The Review of Economic Studies, 38, 307–317.

Sen, A. K. (1973) "Behavior and the Concept of Preference." Economica, 40, 241–59.

Slovic, P., Lichtenstein, S., and Edwards, W. (1965) "Boredom-induced Changes in Preferences among Bets." The American Journal of Psychology, 78, 208–217.

Suzumara, K. (1976) "Rational Choice and Revealed Preference." The Review of Economic Studies, 43, 149–58.

Tversky, A. (1969) "Intransitivity of Preferences." Psychological Review, 76, 31–48.

Weinstein, A. A. (1968) "Transitivity of Preference: A Comparison among Age Groups." Journal of Political Economy, 76, 307–311.

Int. Studies of Man. & Org., Vol. XI, No. 1, pp. 56-74
M. E. Sharpe, Inc.

THE MANAGEMENT OF CHANGE

Eduard Gabele (Federal Republic
of Germany)

Basic changes in organizations are extremely complex processes. Usually, several managerial groups participate in such processes, and often, many employees are affected. Successful change is not guaranteed. More likely, a series of problems must be solved, decisions reached, and activities carried out that steer the process, giving it momentum and directing its progress. These events occur over time.... Problem-solving activities can be divided into a number of intermediate steps. Two stages — initiation and implementation — will be of particular interest here. In addition, organizational behavior can be directed toward supporting or resisting change.

Organizational change requires that different people become involved. These may include outside consultants. But more

---

The article "Das Management von Neuerungen. Eine empirische Studie zum Verhalten, zur Struktur, zur Bedeutung und zur Veränderung von Managementgruppen bei tiefgreifenden Neuerungsprozessen in Unternehmen" was first published in Zeitschrift für betriebswirtschaftliche Forschung, 1978, 30, 194–226. It has been abridged and translated by Roger L. M. Dunbar and Rudi K. Bresser, and is reprinted with the permission of the publisher.

Dr. Eduard Gabele is a Research Fellow (Akademischer Rat and Privatdozent) at the University of Munich, Federal Republic of Germany.

important are organization members who are affected by the change. The chance to participate and influence the change process depends on task assignments in the existing organizational hierarchy. Grün and co-workers (1972) suggest that participants may be classified according to their institutional membership and their hierarchical and functional positions. Following this suggestion, Dumont du Voitel (1976) distinguishes among the following managerial groupings:

(1) external control organs: the various supervisory and directorial boards that govern German corporations (management of the conglomerate group = Konzernleitung; management of the holding company = Leiting der Holding; supervisory board of directors = Aufsichtsrat);

(2) management levels:

— top management (executive boards = Vorstand, Geschaftsleitung),

— middle management (e.g., manager of functional area = Leiter von Funktionsbereich),

— lower management (other employees with management functions = Sonstige leitende Angestellte);

(3) specialist departments (e.g., planning, organization design, data processing);

(4) project groups (e.g., project management, task forces, consultants).

Each of these managerial units has more or less established roles to fill that distinguish them from other groups.... For example, on the basis of a text analysis of a complex decision process, Witte (1970) found that the tasks performed clustered into three groupings corresponding to top, middle, and lower management. Behavioral expectations are related to task structures, and organization members generally act in accordance with these constraints.

Such classification schemes usually reflect formally assigned tasks that must be carried out again and again in a consistent manner. In times of change, however, it is not clear that the expected behavior by these different groups will be maintained. In this paper the objective is to determine how these different

groups are perceived to behave during change processes.

Perceptions of Involvement in Initiation and Implementation Processes

In 1974 and 1975, structural interviews were carried out in 276 enterprises with more than 1,000 employees in the Federal Republic of Germany (Kirsch and co-workers, 1975). In the recent past many of these firms had experienced one of the following fundamental changes: (1) introduction of profit centers, (2) a merger, (3) introduction of an electronic data-processing (EDP) system, (4) introduction of a planning system, (5) a change in the marketing organization, (6) introduction of a new leadership style, (7) introduction of co-determination (formally structured participation) models. In total, there were 188 examples of major change processes in the sample....

The firms were asked to evaluate how frequently and intensely various managerial units were involved in, first, initiating and, second, implementing changes. In addition, firms were asked to evaluate the extent to which managerial groupings supported or resisted change behavior. Assessments were made on a seven-point Likert scale. To help in these assessments a list of possible activities associated with "initiation" and "implementation" was provided.

In a first step, the evaluations of involvement in initiation and implementation were factor-analyzed to determine which managerial units appeared to have a similar amount of involvement. The results appear in Tables 1 and 2.

The factor analysis shows that in both the initiation and the implementation of change, three clusters of managerial units can be distinguished.... These three factors account for about 40 percent of the total variance.... On the basis of the factor loadings, almost all the managerial units can be placed in one of the three factorial groupings. Cluster analyses (Johnson, 1967) were also performed, and these confirm almost exactly the groupings obtained by the factor

Table 1

Rotated Factor Pattern of the Involvement of Managerial Units in Initiating Change

Managerial unit	Factor 1	Factor 2	Factor 3
Management of the conglomerate	-0.371	0.688	-0.003
Supervisory board of directors	0.017	0.844	-0.102
Top management	0.068	0.473	-0.140
Middle management	0.857	0.014	0.034
Lower management	0.472	0.032	0.243
Central planning	0.094	0.023	0.414
Project management	-0.040	-0.104	0.568
Organizational design department	-0.050	0.033	0.729
EDP department	0.168	-0.145	0.629
Consultants	0.128	0.509	0.099
Task forces/committees	0.239	0.208	0.233

analyses.* The following list summarizes the very similar groupings for the involvement of managerial units in initiating and implementing change activities:

Initiation	Implementation
Management A_1	Management A_2
Management of the conglomerate	Management of the conglomerate
Supervisory board	Supervisory board
Top management	Top management
Consultants	Consultants
	Central planning

*To eliminate redundancy, the cluster analyses are not included here. They are reported in the original (German) version of this article. — Eds.

Initiation	Implementation
Management B_1	Management B_2
Middle management	Middle management
Lower management	Lower management
Task forces/committees	Task forces/committees
Management C_1	Management C_2
Central planning	Project management
Project management	Organizational design department
Organizational design department	EDP department
EDP department	

Table 2

Rotated Factor Pattern of the Involvement of Managerial Units in Implementing Activities

Managerial unit	Factor 1	Factor 2	Factor 3
Management of the conglomerate	-0.413	0.548	-0.056
Supervisory board of directors	-0.021	0.882	-0.161
Top management	0.107	0.452	-0.147
Middle management	0.682	0.039	-0.023
Lower management	0.640	-0.029	0.031
Central planning	0.101	0.293	0.203
Project managers	-0.020	-0.041	0.614
Organizational design department	0.036	-0.112	0.695
EDP department	0.279	-0.088	0.501
Consultants	0.021	0.354	0.202
Task forces/committees	0.381	0.147	0.169

This suggests that the original classification into four groupings proposed by Dumont du Voitel (1976) is not quite adequate. In the present study, three groupings were found: (1) external control organs (corresponding here to Management A), (2) management levels (corresponding here to Management B), and (3) specialist departments (corresponding here to Management C) — with no separate clustering corresponding to "project groups."

Perceptions of Group Involvement in Support of and Resistance to Change

As change processes may last more than five years, it is possible for the same managerial unit to be both supportive and resistant over this period. This is clear in the results of the factor analyses in Tables 3 and 4, which represent the second step of the data analysis. These factors account for 47 percent of the variance. On the basis of the factor loadings, most managerial units can be placed in one of the factorial groupings. A cluster analysis to check the groupings confirmed the factor analysis.*

The following is a list of similar groupings according to supportive and resistant behavior:

Support	Resistance
Management A_3	Management A_4
Management of the conglomerate	Management of the conglomerate
Supervisory board	Supervisory board
Top management	Top management
	Consultants

*To eliminate redundancy, the cluster analyses are not included here. They are reported in the original (German) version of this article. — Eds.

Support	Resistance
Management B_3	Management B_4
Top management	Middle management
Middle management	Lower management
Lower management	Workers' council
Workers' council (Betriebsrat)	Task forces/committees
Management C_3	Management C_4
Central planning	Central planning
Project managers	Project managers
Organizational design department	Organizational design department
EDP department	EDP department
Consultants	
Task forces/committees	

Table 3

Rotated Factor Pattern of the Involvement of Managerial Units in Support Activities

Managerial unit	Factor 1	Factor 2	Factor 3
Management of the conglomerate	−0.024	0.624	−0.014
Supervisory board	0.035	0.859	0.133
Top management	−0.003	0.357	0.361
Middle management	−0.024	0.101	0.746
Lower management	0.077	−0.025	0.669
Central planning	0.345	0.175	0.180
Project manager	0.541	−0.247	0.190
Organizational design department	0.451	−0.253	0.401
EDP department	0.606	−0.251	0.234
Consultants	0.748	0.371	−0.248
Task forces/committees	0.609	−0.002	0.014
Workers' council	0.228	0.096	0.498

Table 4

Rotated Factor Pattern of the Involvement of Managerial Units in Resistance Activities

Managerial unit	Factor 1	Factor 2	Factor 3
Management of the conglomerate	0.083	0.677	-0.024
Supervisory board	-0.033	0.817	-0.015
Top management	-0.032	0.627	0.257
Middle management	0.174	0.117	0.626
Lower management	0.113	-0.137	0.896
Central planning	0.727	-0.009	0.020
Project managers	0.735	0.026	0.107
Organizational design department	0.666	0.074	-0.043
EDP department	0.500	-0.036	0.191
Consultants	0.269	0.312	0.135
Task forces/committees	0.056	0.036	0.374
Workers' council	-0.039	0.171	0.638

This analysis suggests that the composition of those managerial units that combine into groups to support or resist changes is very similar, but is somewhat different from the groups involved in initiating and implementing problem solutions.

Different Managerial Units in the Change Process

We now explore which managerial units play the most important roles in change processes. In the literature, it is frequently assumed that not all have an equal chance to influence change processes (Dumont du Voitel, 1976; Gebert et al., 1974; Grochla, 1973; Kirsch et al., 1978; Kubicek, 1975; Thom, 1966; Witte, 1970; Zaltman et al., 1973). A simple model begins with the hierarchical position of the unit in the firm, a higher position having more opportunities to participate in the change process (Bleicher and Meyer, 1976; Grochla, 1972; Kieser and

Kubicek, 1977; Kirsch, 1976).

If the hierarchical position of the various managerial units is considered, then there is some difficulty in classifying top management, central planning, consultants, and task forces/committees. According to the factor analyses, these units change their groupings depending on the particular behavior associated with the change processes — initiation, implementation, support, or resistance. We shall provide a short analysis of why these units may change their grouping.

As consultants are usually employed by the top executive unit, it makes sense that their problem-solving activities derive from the needs and wishes of this unit. Initially it may seem a contradiction that consultants are also associated with the Management C group as far as support activities are concerned. However, in order to ensure the success of their advice, it is likely that consultants would support those responsible for carrying out the changes they have helped introduce.... A similar explanation is relevant for central planning. Although this unit is not involved with the top hierarchical group in the initiation phase, that group is involved with this unit during the implementation phase, and returns to the Management C grouping to provide support for the change. This parallel behavior of central planning and consultants is, moreover, desirable and frequently conceptualized as a "healthy" competitive relationship. It is also noteworthy that neither central planning nor consultants are ever grouped with the middle group, Management B. It may be that in this context, both consultants and central planners play integrating roles. With this framework, the grouping of consultants with those at the top of the hierarchy is sensible with regard to resistance activity. Consultants align themselves to resist other groups whose intentions run counter to those of the top executive group.

Task forces/committees also change their grouping. Initially they are used to work on problem solutions with Management B. This position is to be expected, because task forces/committees are usually made up of middle managers. Firms expect much from task forces/committees set up to introduce drastic changes

in that they are not only to solve the particular problem but also find a "fair" arrangement that is acceptable to all organizational interests. Therefore, they almost have to represent a middle position. This is not always the case, however, in that insofar as support activities are concerned, they associate themselves with Management C....

Finally, top management (Vorstand) changes from an exclusive orientation toward the top hierarchical group for problem-solution efforts to a broader view that includes the middle hierarchical group for support activities. It seems that here, too, this regrouping may reflect pressure for success, as has already been discussed in the case of advisors and central planners. As far as providing support is concerned, top management is equally concerned with both top and middle hierarchical levels. One can assume that middle management is significantly affected, involved, and interested in basic change. Therefore, additional support for this group may make successful change more likely.

What are the implications of these changes in the groupings of managerial units? Basically, as Tables 5 to 8 show, top management has the greatest influence in all groupings. In this sense there are significant consequences for all the groups involved every time top management changes its activities. For example, for Management B_3, the inclusion of top managers, who provide the strongest support, significantly increases the importance of this grouping.

Consultants and task forces/committees do not make a similarly significant contribution. They play a minor role in both their "normal" grouping and in the groupings to which they move. Indeed, as Tables 5 to 8 demonstrate, task forces/committees contribute the least in almost all the groups with which they are associated. Therefore, it would appear that expectations of high performance from committees, conferences, teams, and task forces are unrealistic. Olson's (1968. P. 52) assumption that committees, subcommittees, and small leadership groups may play a decisive role if they are introduced, does not seem to hold, at least insofar as change processes

Table 5

Rank Order of Managerial Units with Respect to the Initiation of Change

Managerial grouping	Managerial unit	N	$\bar{x}$	$S_{\bar{x}}$	Rank	Rank difference	Significance of difference
A_1	Top management	179	5.02	1.88	1	1–2	<0.001
	Consultants	164	3.08	2.29	2	2–3	<0.05
	Management of the conglomerate	106	2.62	2.16	3	3–4	n.s.*
	Supervisory board of directors	112	2.25	1.86	4		
B_1	Middle management	171	5.36	1.68	1	1–2	<0.001
	Lower management	157	4.31	1.93	2	2–3	<0.05
	Task forces/ committees	153	3.89	2.02	3		
C_1	Organizational design department	159	4.54	2.24	1	1–2	<0.025
	Project managers	122	3.90	2.52	2	2–3	n.s.
	EDP department	152	3.74	2.35	3	3–4	n.s.
	Central planning	121	3.30	2.58	4		

*n.s. = not significant.

Table 6

Rank Order of Managerial Units with Respect to the Implementation of Change

Management grouping	Managerial unit	N	$\bar{x}$	$S_{\bar{x}}$	Rank	Rank difference	Significance of difference
A_2	Top management	178	5.80	1.67	1	1–2	<0.001
	Central planning	129	3.42	2.59	2	2–3	n.s.
	Consultants	153	3.03	2.32	3	3–4	n.s.
	Management of the conglomerate	105	2.90	2.33	4	4–5	n.s.
	Supervisory board of directors	116	2.47	1.98	5		
B_2	Middle management	174	5.78	1.41	1	1–2	<0.001
	Lower management	165	4.74	1.80	2	2–3	<0.005
	Task forces/ committees	148	4.11	2.08	3		
C_2	Organizational design department	160	4.47	2.30	1	1–2	<0.05
	Project managers	129	3.99	2.58	2	2–3	n.s.
	EDP department	156	3.82	2.33	3		

Table 7

Rank Order of Managerial Units with Respect to Support of Change

Managerial grouping	Managerial unit	N	$\bar{x}$	$S_{\bar{x}}$	Rank	Rank difference	Significance of difference
A_3	Top management	179	6.22	1.29	1	1–2	<0.001
	Management of the conglomerate	92	3.78	2.66	2	2–3	n.s.
	Supervisory board of directors	103	3.50	2.52	3		
B_3	Top management	179	6.22	1.29	1	1–2	<0.001
	Middle management	178	5.28	1.49	2	2–3	<0.001
	Lower management	168	4.47	1.63	3	3–4	<0.001
	Workers' council	126	2.90	2.02	4		
C_3	Organizational design department	151	5.03	2.13	1	1–2	<0.025
	Project managers	109	4.41	2.43	2	2–3	n.s.
	EDP department	148	4.24	2.33	3	3–4	n.s.
	Central planning	111	3.96	2.56	4	4–5	n.s.
	Consultants	121	3.47	2.50	5	5–6	n.s.
	Task forces/ committees	111	3.07	2.18	6		

Table 8

Rank Order of Managerial Units with Respect to Resistance to Change

Managerial grouping	Managerial unit	N	$\bar{x}$	$S_{\bar{x}}$	Rank	Rank difference	Significance of difference
A_4	Top management	144	1.65	1.14	1	1–2	<0.025
	Supervisory board of directors	93	1.35	0.87	2	2–3	n.s.
	Management of the conglomerate	85	1.22	0.71	3	3–4	n.s.
	Consultants	113	1.21	0.59	4		
B_4	Lower management	160	2.77	1.51	1	1–2	n.s.
	Middle management	157	2.56	1.52	2	2–3	<0.001
	Workers' council	118	1.93	1.39	3	3–4	<0.025
	Task forces/ committees	103	1.56	1.01	4		
C_4	EDP department	131	1.46	0.97	1	1–2	n.s.
	Project manager	104	1.38	0.79	2	2–3	n.s.
	Organizational design department	133	1.37	0.73	3	3–4	n.s.
	Central planning	100	1.27	0.71	4		

are concerned. Rather, we can conclude that in change processes, it is only top management that brings a certain flexibility to managerial groupings.

Table 9 allows the role played by the respective managerial groupings with respect to one another to be assessed.... Basically, a managerial grouping plays a more influential role if its importance, as measured in the particular behavioral activity, is judged to be significantly greater than that of the other managerial groupings.... Analysis of all 188 change processes in Table 9 indicates that Management B makes the most signifi-

Table 9

Rank Order of all Managerial Groups in the Change Process

Behavior	Managerial grouping	N	$\bar{x}$	$S_{\bar{x}}$	Rank	Rank difference	Significance of difference
Initiation	B_1	138	4.46	1.43	1	1–2	<0.001
	C_1	99	3.35	1.65	2	2–3	<0.025
	A_1	94	2.86	1.33	3		
Implementation	B_2	144	4.85	1.35	1	1–2	<0.001
	C_2	122	3.92	1.86	2	2–3	<0.001
	A_2	78	3.15	1.10	3		
Support	B_3	121	4.60	1.18	1	1–2	<0.01
	A_3	73	4.06	1.68	2	2–3	<0.001
	C_3	63	3.02	1.34	3		
Resistance	B_4	87	2.05	0.89	1	1–2	<0.001
	A_4	63	1.32	0.57	2	2–3	n.s.
	C_4	83	1.28	0.52	3		

cant contributions with respect to both problem solutions (initiation and implementation) and support and resistance activities. With respect to problem solutions, Management C plays the second most important role, and Management A is third. In resistance, second and third ranks are not significantly distinguishable.

If one simplifies the managerial groupings A, B, and C into top, middle, and lower management, then middle management can clearly be seen to be mainly responsible for important enterprise changes. Following Thompson (1967), one could refer to this middle-management grouping as the "dominant coalition"; following Scott (1973), as the "significant group"; or following Galbraith (1968) and Touraine (1972), as the "technostructure" of change. Middle management obtains partial support from top management and task forces/committees. This seems to confirm Witte's (1968, 1970, 1972, 1973) findings with respect to the "promotor model" and "Parkinson's Law," and also the "package effect" developed by Hauschildt (1977).

These results do not imply that top management is superfluous. Top management continues, as before, to make critical, legitimating, political decisions. For example, top management decided:

— that the change could be carried out (99 percent of cases),
— that particular managerial units would be introduced (95 percent of cases),
— how much time would be allowed (90 percent of cases),
— what resources would be budgeted (88 percent of cases).

Summary

The results may be summarized as follows:

1. We have distinguished three different managerial behaviors associated with basic organizational change processes: (a) problem-solving behavior for change (initiation and implementation, (b) behavior supporting change, and (c) behavior resistant change.
2. While fundamental organizational change processes are

occurring, several groupings of managerial units develop. Managerial units within these groupings behave similarly, but differently from managerial units in other groupings, insofar as the change process is concerned.

3. The groupings of managerial units remain constant with respect to their problem-solving behavior for change.

4. The same holds true for supportive and resistant behavior. Although consultants and task forces/committees change their groupings, this does not change the basic underlying structures of the managerial groupings.

5. Middle management plays the most significant role in basic organizational change processes.

References

Bleicher, K., and Meyer, E. (1976) Führung in der Unternehmung. Formen und Modelle. Reinbek bei Hamburg: Rowohlt.

Dumont du Voitel, R. (1976) "Aktoren in der Initiierung von organisatorischem Wandel — Ein empirischer Beitrag zu einer Theorie des geplanten organisatorischen Wandels." Dissertation, University of Munich.

Galbraith, J. K. (1968) Die moderne Industriegesellschaft. Munich and Zurich: Droemer Knaur.

Gebert, D., Gawlik, R., and Herzig, H. U. (1974) Organisationsentwicklung — Probleme des geplanten organisatorischen Wandels. Stuttgart: Kohlhammer.

Grochla, E. (1972) Unternehmungsorganisation — Neue Ansätze und Konzeptionen. Reinbek bei Hamburg: Rowohlt.

Grochla, E. (1973) "Das Engagement der Unternehmensführung bei der Entwicklung computergestützter Informationssysteme." Fort-schrittliche Betriebsführung, 22, 65–72.

Grün, O., Hamel, W., and Witte, E. (1972) "Felduntersuchungen zur Struktur von Informations- und Entscheidungsprozessen." In E. Witte (Ed.), Das Informationsverhalten in Entscheidungsprozessen. Tübingen: Mohr. Pp. 111–64.

Hauschildt, J. (1977) Entscheidungsziele — Zielbildung in innovativen Entscheidungsprozessen: Theoretische Ansätze und

empirische Prüfung. Tübingen: Mohr.
Johnson, S. C. (1967) "Hierarchical Clustering Schemes." Psychometrica, 32, 241–57.
Kieser, A., and Kubicek, H. (1977) Organisation. Berlin and New York: De Gruyter.
Kirsch, W. (1976) Entscheidungsverhalten und Handhabung von Problemen. Munich: University of Munich Press.
Kirsch, W., Gabele, E., Börsig, C., Dumont du Voitel, R., Esser, W.-M., and Knopf, R. (1975) Reorganisationsprozesse in Unternehmen — Bericht aus einem empirischen Forschungsprojekt. Munich: University of Munich Press.
Kirsch, W., Esser, W.-M., and Gabele, E. (1978) Reorganisation — Theoretische Perspektiven des geplanten organisatorischen Wandels. Munich: University of Munich Press.
Kubicek, H. (1975) Informationstechnologie und organisatorische Regelungen — Konzeptionelle Grundlagen einer empirischen Theorie der organisatorischen Gestaltung des Benutzerbereichs in computergestützten Informationssystemen. Berlin: Duncker & Humblot.
Olson, M., Jr. (1968) Die Logik des kollektiven Handelns-Kollektivgüter und die Theorie der Gruppen. Tübingen: Mohr.
Scott, W. G. (1973) "The Theory of Significant People." Public Administration Review, 17, 308–319.
Thom, N. (1976) Zur Effizienz betrieblicher Innovationsprozesse — Vorstudie zu einer empirisch begründeten Theorie des betrieblichen Innovationsmanagements. Cologne: Hanstein.
Thompson, J. D. (1967) Organizations in Action — Social Science Bases of Administrative Theory. New York: McGraw-Hill.
Touraine, A. (1972) Die postindustrielle Gesellschaft. Frankfurt/Main: Suhrkamp.
Witte, E. (1968) Die Organisation komplexer Entscheidungsverläufe — Materialien zum Forschungsbericht. Mannheim: University of Mannheim Press.
Witte, E. (1970) "Informationsaktivität und Entscheidungsobjekte. Eine Tangente zu Parkinsons 'Gesetz der Trivial-

ität.'" In H. -B. Ortlieb, B. Molitor, and W. Krone (Eds.), Hamburger Jahrbuch für Wirtschafts- und Gesellschaftspolitik. Tübingen: Mohr. Vol. 15, pp. 163–75.

Witte, E. (1972) Das Informationsverhalten in Entscheidungsprozessen. Tübingen: Mohr.

Witte, E. (1973) Organisation für Innovationsentscheidungen. Göttingen: Schwartz.

Zaltman, G., Duncan, R., and Holbek, J. (1973) Innovations and Organizations. New York: Wiley.

Int. Studies of Man. & Org., Vol. XI, No. 1, pp. 75-103
M. E. Sharpe, Inc.

DETERMINANTS OF COORDINATION IN BUSINESS ORGANIZATIONS
A Reformulation of Empirical Results by Pugh and Co-workers and by Child

Michael Wollnik and Herbert Kubicek
(Federal Republic of Germany)

The Operational Meaning of Coordination

Problems of coordination have always been of special interest in organization theory. Coordination in business firms has been the subject of Anglo-American management theory (1), of German organization theory (Adam, 1969; Albach, 1966; Bleicher, 1968; Frese, 1972; Fuchs-Wegner and Welge, 1974; Hax, 1965; Kosiol, 1962; Nordsieck, 1965; Schmalenbach, 1947/1948), and of organizational sociology (Büschges and Lütke-Bornefeld, 1974; Galbraith, 1973; Khandwalla, 1972; Kieser,

---

The article "Einflussfaktoren der Koordination in Unternehmungen. Eine Neuformulierung der empirischen Ergebnisse von Pugh et al. und Child" was first published in Zeitschrift für betriebswirtschaftliche Forschung, 1976, 28, 502–524. It has been abridged and translated by Rudi K. Bresser and Roger L. M. Dunbar, and is reprinted with the permission of the publisher.

Dr. Michael Wollnik is a Research Fellow (Wissenschaftlicher Assistent) at the University of Cologne, Federal Republic of Germany; Dr. Herbert Kubicek is Professor of Business Administration, University of Trier, Federal Republic of Germany.

1973; Kirsch, 1971; Lawrence and Lorsch, 1967; March and Simon, 1958; Thompson, 1967; Ziegler, 1975).

In spite of all this work, the conceptual distinction between "coordination" and "organization" has remained problematic, not least because some management theorists partially equate the two concepts (e.g., Urwick, 1963). However, there does seem to be a consensus that coordination and specialization are the two basic organizational phenomena (Fayol, 1949; Grochla, 1972; Köster, 1969; Nicklisch, 1922). In this study, organization is defined to include all formal, predominantly impersonal rules that determine behavior in social systems; and coordination is defined as being limited to those rules that determine work-related interaction directed toward goal accomplishment. If coordination does not result from rules that are a part of job descriptions and are implemented through task, communication, or competence specifications, but instead reflects immediate communications such as directions from superiors, then, on the basis of the definition of organization chosen here, no means of organizational coordination exists.

In fact, organization theories have not clarified questions relating to different forms of coordination and their specific effects. In this paper we intend to make an initial contribution to the development of a social theory of coordination. The perspective will be somewhat limited, restricted to investigating the conditions for introducing instrumentally manipulable coordination mechanisms and analyzing how they work. The result will be plausible rather than complete, and will allow empirically based distinctions among several forms of coordination to be identified both by referring to classic management concepts and by reanalyzing existing studies of comparative organizational research.

Organizational Structure and Context

The studies reanalyzed are those of Pugh and co-workers (1963, 1968, 1969). To describe organizational structures, Pugh and associates have distinguished five structural dimensions:

(1) Specialization: the extent to which official duties are distributed among a number of positions. Indicators are, first, the extent to which specialized functional areas exist for 16 non-work-flow activities (functional specialization) and, second, the extent to which specialist roles exist for 109 subfunctions (overall role specialization).

(2) Standardization: the extent to which rules and procedures for task accomplishment (e.g., operational control, communication) exist (overall standardization).

(3) Formalization: the extent to which rules, procedures, and instructions are written (overall formalization). Subscales of overall formalization are "formalization of role definitions," "formalization of information passing," and "recording of role performance."

(4) Centralization: the concentration of authority for making decisions at the top levels of the hierarchy (overall centralization).

(5) Configuration: the shape of the role structure as displayed by a detailed organization chart. Indicators are, for example, the vertical span (height) of the work-flow hierarchy, the chief executive's span of control, and ratios of subordinates to work-flow superordinates.

All these dimensions of organizational structure may offer insights into how coordination occurs. They are partly variables with immediate coordinative effects (for example, standardization and centralization) and partly conditions or prerequisites of coordination (e.g., vertical span and subordinate ratio).

In the following analyses, four contextual variables are considered:

(1) Size: the logarithm of the number of employees.

(2) Technology (work-flow integration): the level of automation of the equipment, work-flow rigidity, interdependence of work-flow segments, and the level of quality control.

(3) Geographic dispersion: number of operating sites.

(4) Dependence: dependence on parent organization, on clients and suppliers (vertical dependence), and on trade unions,

and the extent to which the organization is accountable to the public because of its ownership.

Although they cannot be tested empirically on the basis of comparative studies, hypotheses concerning the relationship between structural and contextual variables assume that asymmetric dependencies do exist and that structure is dependent on context.

The following analyses and interpretations are divided into two sections. First, empirical relations among structural dimensions are discussed with reference to the basic categories "specialization" and "coordination." Then relationships between contextual and structural variables are analyzed, particular attention being given to the role of specialization.

Relationships among Structural Dimensions

Table 1 shows the correlations among overall role specialization, overall standardization, overall formalization, recording of role performance, vertical span, and overall centralization that were obtained by Pugh and co-workers and by Child. From these correlations one can immediately see that:

1. Standardization and formalization are closely interrelated.
2. Recording of role performance is strongly related to overall standardization and formalization.
3. Overall standardization, overall formalization, and recording of role performance are closely related to overall role specialization. Overall role specialization is also related to vertical span. The vertical span displays a relatively strong association with overall standardization and a weaker, but still clearly visible, relationship to overall formalization and recording of role performance.
4. There is a negative relationship between centralization and the other dimensions.

Pugh and associates emphasize the difference in the relationship between overall centralization and the other structural dimensions by performing a factor analysis: overall role specialization, overall standardization, overall formalization, re-

Table 1

Correlations among Structural Dimensions

		1	2	3	4	5	6
1 Overall role specialization	P*	-					
	C*	-					
2 Overall standardization	P	0.80					
	C	0.83	-				
3 Overall formalization	P	0.68	0.83	-			
	C	0.73	0.87	-			
4 Recording of role performance	P	0.54	0.72	0.75	-		
	C	0.68	0.79	0.77	-		
5 Vertical span	P	0.66	0.57	0.48	0.33	-	
	C	0.55	0.51	0.48	0.39	-	
6 Overall centralization	P	-0.53	-0.27	-0.20	-0.27	-0.28	-
	C	-0.43	-0.46	-0.53	-0.22	-0.41	-

Source: J. Child (1972).
*P = Pugh et al.; C = Child.

cording of role performance, and vertical span form one factor (positive factor loadings of 0.87, 0.89, 0.87, 0.69, and 0.69) on which overall centralization can be seen to have a relatively low and negative loading (−0.33). However, centralization constitutes a second orthogonal factor, with a high loading of 0.83. Pugh and co-workers call the first factor "structuring of activities" and the second, "concentration of authority" (Pugh et al., 1968. Pp. 85–87). This result implies the following:

1. Structuring of activities and concentration of authority

represent the two most important components of organizational structures.

2. As structuring of activities and concentration of authority are independent quantities (2), an organizational structure can have any combination of these features.

Child has criticized these assertions for two reasons, and in the process has considerably clarified the issues (Child, 1972, 1973; Mansfield, 1973; Reimann, 1973).

The first criticism relates to the second assertion. Most likely the results obtained by Pugh and co-workers are due to an overrepresentation in the sample of branch plants of organizations. This is discussed further below. The immediate result is a strong, spurious relationship between the variable overall centralization and another structural indicator, autonomy, which measures the distribution of authority between parent organizations and subsidiaries. In this respect Child's data are more representative. He obtained just one factor on which overall role specialization, overall standardization, overall formalization, recording of role performance, and vertical span all loaded positively (0.88, 0.92, 0.90, 0.79, 0.66) and centralization loaded negatively (−0.59). This result challenges the assumption of independence between centralization and the other five structural dimensions and instead suggests a unidimensionality of "structuring" and "centralization." All structural dimensions may be aspects of a single organizational dimension, which can be described as a "form of direction" (Steuerungsform). Hypothesis 2 is modified to:

2.' The dimensions (1) structuring of activities and (2) concentration of authority are not independent quantities, but elements of an organization's form of direction that develop inversely to one another and, when extreme values are reached, represent two clearly distinguishable alternative structural forms for directing an organization:

(i) Direction through personal instructions, in which only a few people are authorized to make initial strategic and administrative decisions. This directing strategy, reserving decision making to specific structural

positions, economizes on the need for systems of procedures and paperwork and reduces the necessity of coordinating subordinates' activities by defining hierarchical limits on discretion. Direction is "centralized," combining a high score on centralization with low scores on vertical span, standardization, formalization, and specialization.

(ii) Direction through the use of generally accepted rules and procedures that specifically define task content, who is competent to make decisions and the limits on his or her discretion, and how work is to be done. This type of direction allows for more delegation or decentralization (Blau and Schoenherr, 1971. P. 121) and requires decentralization if employees start to demand special rights and autonomy or if the formulating of procedures requires such a degree of professional skill that intervention from senior levels is unlikely. As this directing strategy is characterized by high standardization, formalization, specialization, vertical span, and decentralization, Child, following Weber, labeled it "bureaucratic."

The second criticism relates to the first, more general assertion made by Pugh and associates. Their factor solution is unsatisfactory mainly because it includes "specialization" in the factor "structuring of activities." On the one hand, the argument that the degree of specialization is an indicator of role specificity (Hickson, 1966) cannot be denied. On the other hand, integrating the two basic phenomena specialization and coordination unifies two organizational elements that, conceptually, should establish a polarity. An accentuation of the differences between these interdependent phenomena will allow better interpretations.

High scores on the structural dimensions standardization, formalization, recording of role performance, vertical span, and centralization indicate a bureaucratic style of direction. Therefore, if specialization is isolated, the other dimensions indicate the form of coordination being utilized. The style of

direction can be interpreted as an alternative coordination strategy that depends on the degree of specialization: increased specialization decreases the degree of centralized direction. The correlations in Table 1 support this interpretation.

Thus, the following pattern of coordination mechanisms emerges. So long as specialization is low, activities are comprehensible, and necessary strategic and coordinating decisions can be reached by a few decision makers at most senior levels. Under these conditions, the pressure and inclination to establish procedures and to program activities are both low. Standardization takes place on the basis of routine behavior. The limited specificity of task assignments hinders standardization in the form of written directions.

Increasing differentiation and an increasing number of specialized positions make the direction and coordination of activities more complicated. Decision makers at senior levels are forced to delegate authority, as both their comprehension of ongoing activities and their expertise decrease. The use of and trust in specialist knowledge are further reasons for increased delegation of authority. In order to ensure that specialized and separated activities are coordinated and controlled, social institutions increasingly develop hierarchical structures and replace centralized decisions with a system of general and specialized rules and procedures. Increased employment of highly specialized personnel fosters pressure toward rationalization and the development of optimal procedures. Moreover, interdependencies force predictable and rational activity flows in organizational subsystems. The degree of specialization thus represents a major determinant of the degree of the organization's coordination strategy, which is here represented by polar extremes. The following analysis of relationships between contextual and structural variables serves to clarify further the determinants of alternative forms of coordination. The discussion thus far can be summarized in the following revision of hypothesis 1:

1.' The two most important components of organizational structures are represented by the degree of specialization and

the form of coordination. Coordination forms can be described by structural characteristics; they span a continuum from centralized to bureaucratic coordination.

Relationships between Contextual and Structural Variables

After we have separated specialization from the other contextual dimensions and defined it as a determinant of the form of coordination, the question remains, What status has specialization in the pattern of relationships between context and organizational structure? The image of a chainlike relationship among context, specialization, and coordination suggests that particular consideration should be given to relationships between contextual variables and specialization. If this image is correct, then by showing the relevant determinants of specialization and the directions of these relationships, we can predict coordination strategy. To test this, the correlation coefficients between contextual variables and the structural dimensions representing different forms of coordination can be used. Should these coefficients be as expected, then specialization's influence on the form of coordination would be neither rejected nor confirmed. A first step toward confirming the assumption that the degree of specialization influences the method of coordination can be accomplished only when an analysis of the direct influences of contextual factors on coordination is compared with an analysis in which the influence of specialization is held constant. To carry out such an analysis, partial correlation coefficients have been calculated. (3) Thus, direct and conditional relationships can be sufficiently isolated. For greater clarity, the indicators "recording of role performance" and "vertical span" are not included in the following analyses. These variables almost always show the already ascertained relationship with forms of coordination.

The Dependence of Specialization on Context

In the studies of Pugh and co-workers, the contextual vari-

ables "size of organization," "dependence," "technology (work-flow integration)," and "geographic dispersion" had the strongest influence on structural dimensions. The correlations among these variables, as obtained by Child (N=82), are shown in Table 2. (4) Row 1 of Table 2 shows that size, dependence, and technology have a positive influence on specialization whereas geographic dispersion, according to the magnitude of the correlation, has no influence on specialization.

An increase in the degree of specialization in larger organizations might be explained, on the one hand, by the need to direct more people, to handle a growing sales volume, and to generate and process larger volumes of information. Efficiency considerations increase the general tendency toward "qualitative reactions to quantitative changes" in order to utilize the advantages associated with specialization. On the other hand, growth is frequently associated with a broadening of activities, with more differentiated environmental segments, and

Table 2

Correlations among Contextual and Structural Variables

	Size	Dependence on other institutions	Technology: work-flow integration	Geographic dispersion
Overall role specialization	0.72	0.42	0.39	0.03
Overall standardization	0.63	0.40	0.26	0.05
Overall formalization	0.58	0.43	0.10	0.07
Overall centralization	−0.58	−0.20	0.13	−0.22

Source: J. Child (1972) "On Predicting and Understanding Bureaucratic Structure." Working paper, London Graduate School of Business Studies, May 1972 (Table 7).

with qualitative extensions of organizational marketing processes, all of which lead to more specialization.

The relationship between work-flow integration and specialization can be explained in that a complex and interdependent process technology certainly produces specialization in production-related work processes (e.g., work-flow setups, inspection, quality control). (5) In addition, the exploitation of the capacity and efficiency potential of an automated and interdependent technology is frequently associated with independent market-related functions.

The positive influences of dependence on specialization (the dependence measure includes, in particular, dependencies on parent organizations) are probably due to an adaptation of organizational subsidiary and branch structures to the structure of the parent organization. On the one hand, the financial power and administrative knowledge of parent organizations, as well as the advantages deriving from both larger-scale and stable external relationships, enhance the potential for structural development and provide subsidiaries a structural base that would not be available to a similar, independent organization. On the other hand, parent organizations are frequently interested in establishing in branches organizational structures that are similar to their own structure, particularly in terms of functional differentiation. This interest reflects the desire to create conditions that facilitate organizational communication and strategic integration. (6)

The Correlations between Context and Coordination Variables

If the hypothesis holds that the degree of specialization is a critical determinant of the coordination form utilized, then companies with contextual profiles that foster specialization, i.e., those of large size with strong dependence and interdependent technologies (contextual profile I), should tend to adopt a bureaucratic form of coordination (coordination form I). Companies with contextual profiles that hinder specialization, i.e.,

those of small size with independence and less interdependent technologies (contextual profile II), should tend toward a centralized coordination form (coordination form II).

The contextual variables size and dependence tend to support these expectations (see Table 2), although the correlation between dependence and centralization is relatively low. Pugh and co-workers obtained a positive correlation (r=0.57) for this relationship. In the following, it will be shown that this contrast reflects differences in the samples obtained by Pugh and associates and Child; in turn, this will allow a plausible hypothesis to be formulated to explain the correlation that Child found.

In contrast, the relationships between the coordination variables and work-flow integration do not indicate a clear picture with respect to specific forms of coordination. The correlations are low and positive for standardization, formalization, and centralization. Possibly, a complex and interdependent technology does require specialized positions; but like automated information technologies, it also performs an integrating function. Thus, "objective pressures" dominate task fulfillment; and in spite of an increase in technical interdependence and specialization, the intensity of bureaucratic direction may remain stabilized at a particular level, given that existing authority distributions are maintained and notwithstanding tendencies toward more centralization. (7) This hypothesis concerning the "substitutional effect of technologically conditioned modes of organizational direction" in relation to the bureaucratic means of coordination, i.e., standardization and formalization, can be tested by calculating partial correlations, holding the effects of specialization constant....

The differences in the samples studied by Pugh and co-workers and Child can be summarized as follows (Child, 1972): Compared with Child's national sample, Pugh and co-workers' sample, which was restricted to the English Midlands, includes a relatively larger proportion of small and dependent organizations that are as geographically dispersed as larger and independent organizations. The type of organization that is repre-

sented is relatively small in size, strongly dependent, and probably includes several small and adjacent, operating sites. For technical-measurement reasons, such companies will display a relatively high degree of centralization. In contrast, in Child's sample geographically diversified companies are independent and large. These differences can be recognized in Table 3.

The Relevance of Specialization for the Form of Coordination

Hypotheses concerning the relationships between contextual factors and coordination forms are based on the observation that organizations resembling contextual profile I have high

Table 3

Correlation Differences between the Samples of Pugh and Co-workers (P) and Child (C)

		Size	Dependence	Geographic dispersion	Centralization
Size	P				
	C	-			
Dependence	P	−0.17	-		
	C	0.21	-		
Geographic dispersion	P	0.14	0.05	-	
	C	0.46	−0.21	-	
Centralization	P	−0.39	0.57*	0.39*	-
	C	−0.58	−0.20	−0.22	-

Sources: D. Pugh et al. (1969); J. Child (1972) "On Predicting and Understanding Bureaucratic Structure," op. cit. [Table 2] (Table 7); J. Child (1973).

* = Correlations between contextual variables and concentration of authority.

specialization scores (specialization type I), and organizations similar to contextual profile II score low on the specialization scale (specialization type II). This suggests the following specific hypothesis: The tendency of a company to adopt a bureaucratic coordination form in a context approaching contextual profile I is a consequence of a simultaneous tendency to approach specialization type I; the same holds for relationships between contexts similar to contextual profile II, centralized coordination, and specialization type II. If this hypothesis holds, then contextual factors should have only a marginal impact on forms of coordination after controlling for specialization. The partial correlations of contextual factors with standardization, formalization, and centralization, after controlling for specialization, are shown in Table 4.

The partial correlations between size and standardization and size and formalization clearly decrease compared with the zero-order correlations, whereas the partial coefficient between size and centralization is not significantly smaller than the zero-order correlation. It follows that companies with similar degrees of specialization have similar degrees of standardization and formalization in spite of differing sizes. On the other hand, centralization decreases independently of specialization as company size increases. The partial correlations between specialization and standardization, formalization and centralization, after controlling for size ($r_{partial}$ = 0.70, 0.55, −0.02) (8) indicate that although large companies with more specialization also tend to have more bureaucracy, within companies of similar size an increase in specialization immediately induces increases in standardization and formalization, whereas the level of decentralization remains unaffected.... Standardization and formalization seem to be much less sensitive to changes in size than to changes in specialization. By contrast, the decentralization component of bureaucratic coordination seems to be affected by size variations even when specialization remains unchanged.

So far as dependence is concerned, it is necessary to investigate whether the assumed adaptation of the structures of sub-

Table 4

Zero-order and Partial Correlations, Controlling for Specialization, Relating Contextual and Coordination Variables

	Size		Dependence		Work-flow integration		Geographic dispersion	
	Zero-Order	Partial	Zero-Order	Partial	Zero-Order	Partial	Zero-Order	Partial
Standardization	0.63	0.08	0.40	0.10	0.26	−0.12	0.05	0.04
Formalization	0.58	0.11	0.43	0.20	0.10	−0.30	0.07	0.07
Centralization	−0.58	−0.43	−0.20	−0.02	0.13	0.36	−0.22	−0.22

Table 5

Summary of Zero-order and Partial Correla-

	1		2		3		4	
	Partial	Zero-Order	Partial	Zero-Order	Partial	Zero-Order	Partial	Zero-Order
1 Size		1					-	
		2					0.53	
		3					0.50	0.46
		4					-	
		5					0.63	
2 Dependence				1	0.15		−0.35	
				2	-		-	
				3	-	0.19	−0.20	−0.21
				4	0.21		-	
				5	0.03		−0.25	
3 Technology						1	−0.23	
						2	−0.05	
						3	-	−0.09
						4	-	
						5	−0.11	
4 Geographic dispersion								1
								2
								3
								4
								5
5 Specialization								
6 Standardization								
7 Formalization								
8 Centralization								

*Reading across, variables controlled in calculating the partial correlations in row 4, geographic dispersion; row 5, specialization.

tions among Contextual and Structural Variables*

5		6		7		8	
Partial	Zero-Order	Partial	Zero-Order	Partial	Zero-Order	Partial	Zero-Order
-		-		-		-	
0.71		0.61		0.55		−0.56	
0.70	0.72	0.60	0.63	0.58	0.58	−0.63	−0.58
0.80		0.68		0.62		−0.55	
-		0.08		0.11		−0.43	
0.40		0.35		0.39		−0.10	
-		-		-		-	
0.38	0.42	0.37	0.40	0.42	0.43	−0.23	−0.20
0.44		0.42		0.46		−0.26	
-		0.10		0.20		−0.02	
0.32		0.14		−0.05		0.34	
0.35		0.08		0.02		0.17	
-	0.39	-	0.26	-	0.10	-	0.13
0.39		0.26		0.11		0.11	
-		−0.12		−0.30		0.36	
−0.49		−0.35		−0.27		0.06	
0.13		0.15		0.18		−0.27	
0.07	0.03	0.08	0.05	0.08	0.07	−0.21	−0.22
-		-		-		-	
-		0.04		0.07		−0.22	
	1	0.70		0.55		−0.02	
	2	0.81		0.67		−0.39	
	3	0.82	0.83	0.75	0.73	−0.41	−0.43
	4	0.83		0.73		−0.43	
	5	-		-		-	
			1	0.80		−0.15	
			2	0.84		−0.42	
			3	0.88	0.87	−0.52	−0.46
			4	0.87		−0.46	
			5	0.69		−0.20	
					1	−0.29	
					2	−0.50	
					3	−0.52	−0.53
					4	−0.53	
					5	−0.35	

the numbered rows, are: row 1, size; row 2, dependence; row 3, technology;

sidiary organizations to the structures of parent organizations is restricted to the degree of specialization or is also applicable to the form of coordination. The partial correlations between dependence and the structural variables standardization and formalization, after controlling for specialization ($r_{partial}$ = 0.10, 0.20), together with the corresponding correlations after controlling for size ($r_{partial}$ = 0.35, 0.39), show that dependent companies of similar size are more standardized and formalized than independent firms. But this does not hold for companies with similar degrees of specialization. Thus, adaptation of the forms of coordination used in parent organizations takes place only if there is also a high degree of specialization. This result confirms the hypothesis concerning the relevance of specialization.

On the other hand, the relationship between dependence and centralization clearly decreases not only after controlling for specialization ($r_{partial}$ = −0.02) but also after controlling for size. Nevertheless, the partial correlation coefficient of $r_{partial}$ = −0.10 cannot be seen as confirming the related assumption that branches of comparably sized companies — because of their higher degrees of specialization, standardization, and formalization — would need less centralization than independent companies.

One may try to develop an explanation for centralization that goes beyond the technical measurement distortions reflected in the relationship between dependence and centralization. On the basis of the partial correlation between dependence and centralization, controlling for size, it seems plausible that the decision to decentralize branches is linked to neither organizational dependence nor the related degree of specialization but, ultimately, to branch size. Decentralization in dependent companies is influenced by two decisions, both of which in turn depend on branch size:

First, it has to be decided how much autonomy branches should have. Second, the amount of decentralization within branches has to be established. Small branches will have somewhat less autonomy and be centrally directed, whereas

large branches will have more autonomy and be more decentralized within themselves.

The partial correlation between size and centralization, also controlling for dependence, supports this argument: at any level of dependence, the more strongly decentralized companies are, the larger they are ($r_{partial} = -0.56$). Moreover, the hypothesis concerning the influence of size is reconcilable with the different correlations between dependence and centralization obtained by both Pugh and co-workers and Child. Thus, the hypothesis is indirectly confirmed. Owing to the relatively large proportion of small and dependent companies in the sample of Pugh and co-workers, even if one disregards the technical measurement deficiencies, a positive relationship between dependence and centralization can still be predicted. Child's negative zero-order correlation of $r = -0.20$ can, according to this argument, be related to the fact that in his sample, dependent companies tended to be larger (see Table 3).

The results concerning the influence of size on centralization compared with the effects of specialization suggest that the prediction of forms of coordination through specialization alone may not be sufficient to explain centralization. The separate dimensions that combine to establish the form of coordination are determined by different factors. Organization size not only influences decentralization independently of specialization but also has a dominant influence compared with dependence. Thus, size can be considered the predominant determinant of decentralization.

The substitution effects of automatic production and technological integration on bureaucratic forms of coordination are confirmed by the partial correlations between technology and the structural dimensions standardization, formalization, and centralization after controlling for specialization. Companies with similar degrees of specialization that are technologically highly integrated are less bureaucratic....

By exploiting the coordination potential of integrated technologies, companies might be able to neutralize the pressures toward more bureaucracy resulting from increased specializa-

tion more successfully than firms with a more isolated, craft technology. In every case, and independent of other influences, an integrated technology increases the degree of specialization and, through this, positively influences standardization and formalization, and, independent of size effects, also centralization ($r_{partial} = 0.34$). This "technologically supported coordination" is characterized by relatively high levels of standardization, formalization, and centralization.

The partial correlation between geographic dispersion and the structural dimensions, after controlling for specialization, are similar to the zero-order correlations. Child's data seem to indicate that companies with similar degrees of specialization tend to be somewhat more decentralized, as they have several operating sites. By contrast, the data of Pugh and co-workers reveal a positive zero-order correlation between geographic dispersion and concentration of authority ($r = 0.39$). These contrasts probably reflect the differences in the characteristics of the organizations making up the two samples, which also include differences in geographic dispersion. In the Pugh and co-workers' sample, geographically dispersed companies are rather small and dependent and probably have smaller, neighboring branches. In Child's sample geographically dispersed companies are larger and more independent. It seems reasonable to assume that relationships between geographic dispersion and centralization reflect the conditions on which a decision is made on whether branch unit direction should be delegated to the branches themselves.

When discussing the effects of dependence, we pointed out that decisions on branch autonomy depend on the size of the branches. An analogous situation exists when decisions are made to delegate autonomy to geographically separate branches; here, also, branch size may be crucial. (9)

Thus, the decentralization of geographically dispersed companies does not depend on specialization but rather on company size, branch size, and the distances between geographically dispersed branches. On the basis of this hypothesis, it is not surprising that Pugh and co-workers obtained a positive, and

Child a negative, correlation between geographic dispersion and centralization. From this it can be concluded that insofar as geographic dispersion is concerned, specialization is not the crucial mediating factor between context and centralization. The tendency of a company to move toward bureaucratic forms of coordination when approaching contextual profile I is, at least as far as decentralization is concerned, not due to a simultaneous approach toward specialization type I, but rather to increasing size.

In contrast, the different pressures three of the four contextual factors generate toward more bureaucracy in the form of more standardization and formalization basically are expressed in increases in specialization. This follows because the intensity of relationships between contextual factors and standardization and formalization always decreases considerably, or even reverses, when the effects of specialization are controlled. On the other hand, relationships between specialization and standardization/formalization remain stable when the effects of contextual factors are controlled. For geographic dispersion, the partial correlations with standardization and formalization, after controlling for specialization, do not differ from the zero-order correlations. This suggests that the seemingly neutral relationship between geographic dispersion and both standardization and formalization is not related to specialization. It means, moreover, that the degree of specialization does not mediate relationships between geographic dispersion and coordination variables. A reconceptualization is necessary to determine the role played by geographic dispersion.

If one considers that geographic dispersion basically represents a method of subtask allocation and that specialization represents a goal-oriented distinction of subtasks, then a similarity emerges between these two quantities. Specialization and geographic dispersion are both interpretable as strategies for creating organizational subunits. The actual relationship between the two strategies is a result of a two-step decision process. First, one has to decide whether the necessary functions should be accomplished by spatially separate subunits or

within a single complex. Second, one has to determine what degree of specialization should exist, given the conditions established by the first decision. Child hypothesized that companies of similar size would be less specialized because they would be more geographically dispersed (Child, 1973). The creation of spatially separate subunits is accompanied by both a disuniting effect for the whole company and a homogenizing effect for the subunits, so that there are compensating influences of size on specialization. In fact, after controlling for size, the partial correlation between geographic dispersion and specialization is clearly negative ($r_{partial} = -0.49$). The related expectation that companies of a similar size that are strongly spatially differentiated will be less standardized and formalized than spatially concentrated firms is also confirmed by the respective partial correlations ($r_{partial} = -0.35, -0.27$). Indeed, as the association between decreased bureaucracy and increased geographic dispersion can be observed only after size has been controlled, the hypothesis that spatial and functional differentiation are real alternatives for subsystem design receives support.

Conclusions

In summary, the following pattern of relationships between context and structure emerges:

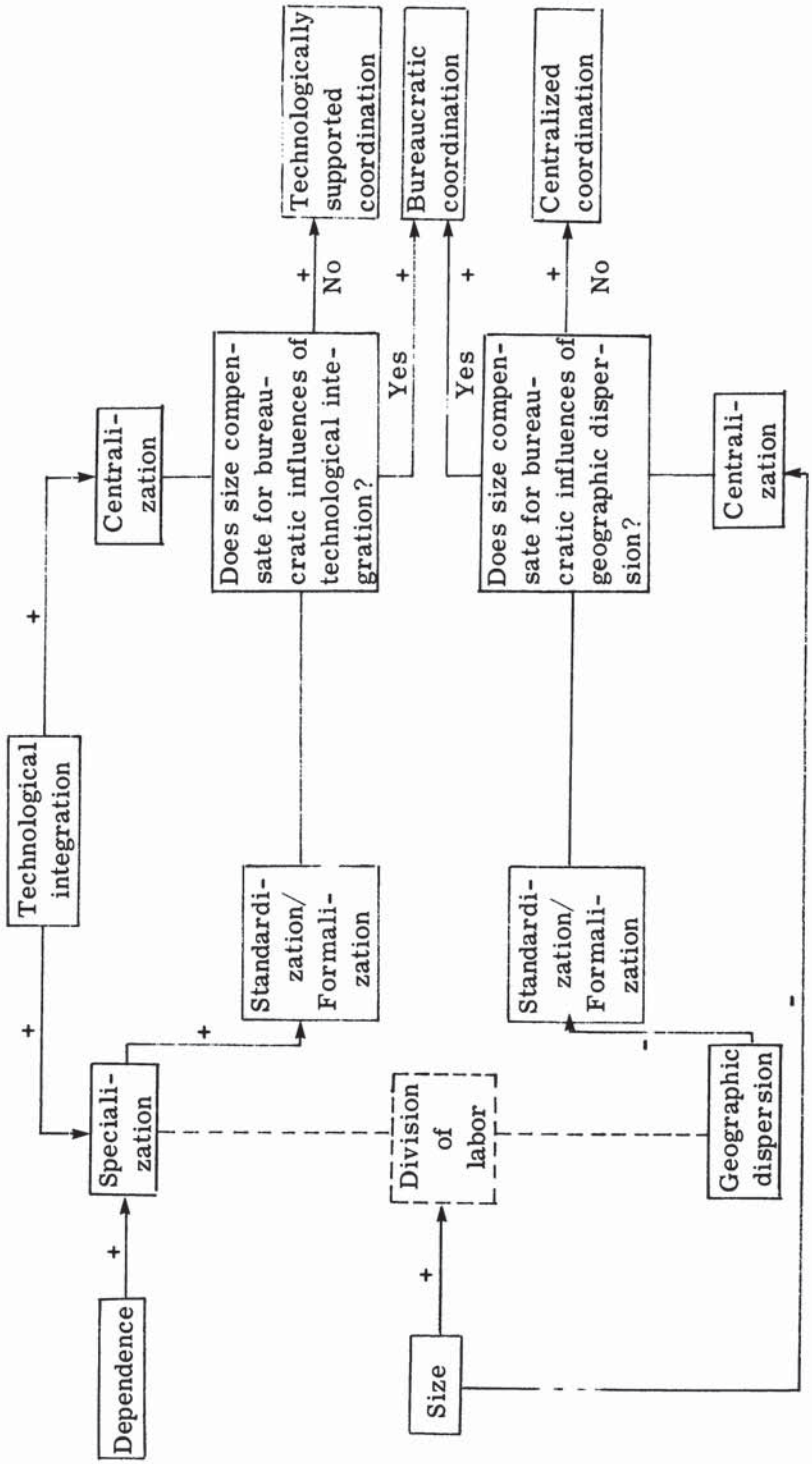
1. Company growth leads to an increased division of labor. The resulting creation of organizational subunits takes place alternatively either from a spatial and geographic viewpoint (geographic differentiation) or by taking account of objective task content (specialization). The more frequently emphasized functional specialization is even more common if companies are larger and more dependent on parent organizations and have more automated and interdependent technologies.
2. An increase in specialization is a prerequisite for a bureaucratic form of coordination and leads to more standardization and formalization.
3. As the decision on the amount of decentralization is a

complementary but not an integrated component of bureaucratic coordination, it is less dependent on the degree of specialization than on factors associated with size. The larger a business firm, the stronger the tendency toward decentralization. Dependent companies decentralize only if they are large, but not, however, by simply adapting the structural patterns of a parent organization.

4. Geographic dispersion hinders specialization in companies of similar size. Owing to its inverse relationship to specialization, much geographic differentiation hinders standardization and formalization and does not create the need for bureaucratic means of coordination, because separate branch units are frequently more easily directed and coordinated. As a result, geographically differentiated companies more often tend toward centralized coordination, so long as their size and the size of the branches allow it. With increased size, they do develop a bureaucratic form of coordination. Increases in branch or parent-organization specialization may be responsible for this, and for an increasing number of specialists who demand more autonomy.

5. Business firms can reduce the pressure toward the standardization and formalization resulting from specialization by using the coordination potential of an integrated technology. However, this reduction is weak, as interdependent technologies themselves establish new pressures toward specialization. Growth-induced needs for decentralization are less crucial for companies with integrated technologies. Companies with integrated and automated technologies prefer technologically supported coordination with high centralization and high standardization and formalization, particularly if decentralization pressures resulting from size are weak. As the need to decentralize increases with company size, technologically integrated firms move toward bureaucratic coordination, with pronounced standardization and formalization and a high degree of decentralization. The accompanying figure represents these relationships.

The results indicate a relatively complex picture for the use



Summary of identified interrelationships and conclusions.

of the three organizational forms of coordination.... Depending on specific contextual conditions, many combinations of coordination means are possible, representing the points between completely centralized and completely bureaucratic extremes.

For further progress toward an empirical theory of coordination, the following conceptual improvements are necessary:

1. The organizational context has to be broadened to include environmental characteristics (e.g., market situation, sociocultural and legal conditions), task characteristics (e.g., task content and formal characteristics), and management philosophy and organizational-climate variables.
2. The measures that describe organizations have to be refined.
3. Organizational forms of coordination should be compared with nonorganizational coordination mechanisms.
4. The desired and undesired effects of means of coordination should be explored, including studies at the level of cognitive processes (perceptions, motivational and behavioral consequences).
5. The introduction of effectiveness criteria should be considered to ensure that any theory of coordination is operationally relevant and related to behavioral practice.

Notes

1) For a survey of works by Fayol, Barnard, Davis, Dale, and Allen that treated coordination either as the main function or as one of several major functions of management, see Haimann and Scott (1974).

2) This assertion is implied by the method of factor analysis (orthogonal) selected by Pugh and co-workers (1968. P. 87).

3) Child and Kieser tried to assess the multiple relations and connections among context, specialization, and coordination variables by carrying out multiple regression analyses (Child, 1973; Kieser, 1973). Because of multicolinearities, the results of these regression analyses are relatively unreliable.

4) The correlations of Pugh and co-workers are reported only if they deviate considerably from those obtained by Child and if these deviations can be considered as bases for further explanation.

5) See Hickson, Pugh, and Pheysey (1969). Kieser (1974) comes to the opposite conclusion, as he obtained almost exclusively negative correlations between technology and specialization.

6) Child (1973) isolated the size of parent organizations as one of the major determinants of specialization. In addition, the partial correlation between dependence and specialization after controlling for size ($r_{partial} = 0.40$) reveals that firms of the same size are more specialized if dependent (see Table 5).

7) Coordinative and behavior-controlling effects of information technology are discussed by Blau and Schoenherr (1971) and by M. Wollnick and H. Kubicek (1974) "Elemente eines handlungsbezogenen Konzeptes der benutzerorientierten Systemgestaltung." Working paper, Fachtagung "Ansätze zur Organisationstheorie rechnergestützter Informationssysteme" der GfI und GMD, Cologne.

8) All partial correlations not listed in Table 4 are presented in Table 5.

9) Further criteria for this decision are, for example, the specialization of branches, the number of branch specialists requiring autonomy, and, most important, the geographic distances between branches and between branches and the head office. Small and neighboring branches located near the head office are presumably controlled by the head office.

References

Adam, D. (1969) "Koordinationsprobleme bei dezentralen Entscheidungen." Zeitschrift für Betriebswirtschaft, 39, 615–32.

Albach, H. (1966) "Die Koordination der Planung im Grossunternehmen." Zeitschrift für Betriebswirtschaft, 36, 790–804.

Blau, P. M., and Schoenherr, R. A. (1971) The Structure of Or-

ganizations. New York: Basic Books.
Bleicher, K. (1968) "Koordinationsorgane in der Unternehmungsorganisation." Zeitschrift für Organisation, 37, 281–88.
Büschges, G., and Lütke-Bornefeld, P. (1974) "Betriebssoziologie." In E. Grochla and W. Wittmann (Eds.), Handwörterbuch der Betriebswirtschaft. (4th ed.) Stuttgart: Poeschel. Vol. 1, pp. 628–36.
Child, J. (1972) "Organization Structure and Strategies of Control. A Replication of the Aston Study." Administrative Science Quarterly, 17, 163–77.
Child, J. (1973) "Strategies of Control and Organizational Behavior." Administrative Science Quarterly, 18, 1–17.
Fayol, H. (1949) General and Industrial Management. London: Pittman.
Frese, E. (1972) "Organisation und Koordination." Zeitschrift für Organisation, 41, 404–411.
Fuchs-Wegner, G., and Welge, M. K. (1974) "Kriterien für die Beurteilung und Auswahl von Organisationskonzeptionen." Zeitschrift für Organisation, 43, 71–82 and 163–70.
Galbraith, J. R. (1973) Designing Complex Organizations. Reading, Mass.: Addison-Wesley.
Grochla, E. (1972) Unternehmungsorganisation. Reinbek bei Hamburg: Rowohlt.
Haimann, T., and Scott, W. G. (1974) Management in the Modern Organization. (2nd ed.) Boston: Houghton-Mifflin.
Hax, H. (1965) Die Koordination von Entscheidungen. Cologne: Heymann.
Hickson, D. J. (1966) "A Convergence in Organization Theory." Administrative Science Quarterly, 11, 224–37.
Hickson, D. J., Pugh, D. S., and Pheysey, D. C. (1969) "Operations Technology and Formal Organization Structure: An Empirical Reappraisal." Administrative Science Quarterly, 14, 378–97.
Khandwalla, P. N. (1972) "Uncertainty and the Optimal Design of Organizations." Working Paper, TIMS 19th Meeting, Houston, Texas.
Kieser, A. (1973) Einflussgrössen der Unternehmungsorgani-

sation. Habilitation. Cologne: University of Cologne.
Kieser, A. (1974) "Der Einfluss der Umwelt auf die Organisationsstruktur der Unternehmung." Zeitschrift für Organisation, 43, 302–314.
Kirsch, W. (1971) Entscheidungsprozesse. Vol. III. Entscheidungen in Organisationen. Wiesbaden: Gabler.
Köster, J. (1969) Die Organisation und ihre Planung. Wiesbaden: Gabler.
Kosiol, E. (1962) Organisation der Unternehmung. Wiesbaden: Gabler.
Lawrence, P. R., and Lorsch, J. W. (1967) "Differentiation and Integration in Complex Organizations." Administrative Science Quarterly, 12, 1–47.
Mansfield, R. (1973) "Bureaucracy and Centralization: An Examination of Organizational Structure." Administrative Science Quarterly, 18, 477–88.
March, J. G., and Simon, H. A. (1958) Organizations. New York: Wiley.
Nicklisch, H. (1922) Der Weg Aufwärts! Organisation. Stuttgart: Poeschel.
Nordsieck, F. (1965) Betriebsorganisation. (2nd ed.) Stuttgart: Poeschel.
Pugh, D. S., Hickson, D. J., Hinings, C. R., Macdonald, K. M., Turner, C., and Lupton, T. (1963) "A Conceptual Scheme for Organizational Analysis." Administrative Science Quarterly, 8, 289–315.
Pugh, D. S., Hickson, D. J., Hinings, C. R., and Turner, C. (1968) "Dimensions of Organization Structure." Administrative Science Quarterly, 13, 65–105.
Pugh, D. S., Hickson, D. J., Hinings, C. R., and Turner, C. (1969) "The Context of Organization Structures." Administrative Science Quarterly, 14, 91–114.
Reimann, B. C. (1973) "On the Dimensions of Bureaucratic Structure: An Empirical Reappraisal." Administrative Science Quarterly, 18, 462–76.
Schmalenbach, E. (1947/1948) Pretiale Wirtschaftslenkung. 2 vols. Cologne and Opladen: G. A. Gloeckner.

Thompson, J. D. (1967) Organizations in Action. New York: McGraw-Hill.

Urwick, L. (1963) "Organization and Co-ordination." In J. Litterer (Ed.), Organizations. Structure and Behavior. New York: Wiley.

Ziegler, R. (1975) "Organisationssoziologie." In E. Grochla, and W. Wittmann (Eds.), Handwörterbuch der Betriebswirtschaft. (4th ed) Stuttgart: Poeschel. Vol. 2, pp. 2186–94.