A STUDY OF ORGANIZATION SIZE, ADMINISTRATIVE COMPONENT, AND COMPLEXITY AMONG NATIONAL VOLUNTARY ASSOCIATIONS

By

CHARLES ARTHUR PRANTER

Bachelor of Arts
Texas Christian University
Fort Worth, Texas
1969

Master of Arts
Texas Christian University
Fort Worth, Texas
1975

Submitted to the Faculty of the Graduate College
of the Oklahoma State University
in partial fulfillment of the requirements
for the Degree of
DOCTOR OF PHILOSOPHY
May, 1979

A STUDY OF ORGANIZATION SIZE, ADMINISTRATIVE COMPONENT, AND COMPLEXITY AMONG NATIONAL VOLUNTARY ASSOCIATIONS

Thesis Approved:

Thesis Adviser

Dean of the Graduate College

ACKNOWLEDGMENTS

The author wishes to express his appreciation to his major adviser, Dr. Ivan Chapman, who taught him to know better. Appreciation is also expressed to the other committee members, Dr. Gene Acuff, Dr. Richard Dodder, and Dr. Kenneth St Clair, for their assistance with the research and with the final preparation of the manuscript.

A note of appreciation is given also to Dr. Jack Bynum, Dr. Charles Edgley, Dr. Edgar Webster, and Dr. Donald Brown, for their interest and encouragement.

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER I

INTRODUCTION

This research is concerned with the question of why the number of administrators varies from one organization to another and/or over time. Previous research into the formal structure of organizations indicates that the size of organizations is the primary explanatory factor influencing the relative size of their administrative components. Present theory regarding the formal structure of organizations concurs with the research findings. Yet, for a number of reasons, the relationship is still open for inquiry. Most of the research has been limited to corporate organizations. The extent to which the relationship holds among organizations of a different nature is not known. One investigation of a sample of occupational associations suggests that organization size is related to the relative size of the administrative component, but only among very large associations. No such research is available for the multitude of other types of voluntary associations. Moreover, much of the research reported in the literature has been called into question because of the problem of definitional dependency. That is, the major variables have been defined operationally in such a way that a ratio of administrative size to organization size is related to organization size. Thus, the two variables are not discrete. Some correlation would be expected between them simply because of the one variable being defined in terms of the other. In order to avoid this problem, a methodology

alternative to the usual one is requisite. An additional problem in the literature is that while theory and empirical research suggest that organizational complexity is an important third variable in the relationship between size and the administrative component, there is no adequate investigation of the effects of this variable among voluntary associations. The only research reported pertains only to occupational associations and does not avoid the problem of definitional dependency. Consequently, the general purpose of this study is to investigate through a multiple regression technique the relationship between organization size, organization complexity, and the relative size of the administrative component among a sample of national voluntary associations, stratified according to organization size. Such an investigation should provide insight into whether and to what extent the formal theory of organization structure, which has been developed solely in the context of corporate organizations, applies to a range of different size voluntary associations.

Research into this question is of interest for several reasons. Among them is the proliferation of formal organizations in Western society and the pervasiveness of such organizations in nearly all phases of human existence. A large part of human behavior occurs within their context. If this behavior is to be understood, there must be some knowledge of the organizational milieu in which it takes place. One aspect of this milieu is what may be characterized as the external structure of the organization, which includes size of the organization, size of the administrative component, and the number and type of sub-parts of the organization. This external structure disposes, at least in part, the behavior of people within the organization, both by effecting the possibilities

for their interaction and by imposing real constraints and demands upon them. The proportion of staff designated as administrative, then, may be expected to influence performance of the organization and the individuals within it.

One important factor in organization performance is the direction and coordination of the various activities within it. The administrative component is normally charged with this function, which allegedly becomes relatively more difficult with an increase in members of the organization and with a greater variety of roles to be played and tasks to be accomplished. It is in this sense that the relative size of the administrative component is considered as a prime dependent variable in much of organization theory.

A practical economic consideration may also be made for this research. Because the nature of the work of administrative personnel, both in business organizations and in voluntary associations, largely is not directly productive, the administrative component is regarded as overhead. In business organizations, it must be supported by the operating units. In voluntary associations, it must be supported by the regular members, usually through membership fees or some form of dues. If the cost of maintaining administrative units remains constant, then disproportionate increases in size or number of these units would result in increased production or service costs, in the case of business organizations, or in increased costs to organization members, in the case of voluntary associations. Therefore, maintenance of the administrative component at the smallest size congruent with organizational effectiveness is of considerable practical concern. Examination of factors which may influence the size of this component should be directly beneficial in this regard.

Concern with such problems is not new. The question of the possible effects of group size on group structure and the relations therein has been a matter of speculation among social thinkers at least since Plato observed that 5040 was a desirable size for a civic population. Later, when the field of sociology was beginning to emerge in the nineteenth century, the question was expropriated from social philosophy as a proper point of inquiry for the new science. In this regard, sociological interest in the effects of size on human groupings may be traced to the positive philosophy of Auguste Comte. Preoccupied as he apparently was with factors affecting progress and order in society, Comte viewed growing numbers in the population as a particular problem when people were increasingly concentrated in a given space:

> It is clear that by this condensation, and especially in its early stages, such a division of employments is favoured as could not take place among smaller numbers: and again, that the faculties of individuals are stimulated to find subsistence by more refined methods; and again, that society is obliged to react with a firmer and better concerted energy against the expansion of individual divergences (Comte, 1853: 128-29).

An idealist-organicist perception of the effects of population size on societal structure is evident in the writing of Herbert Spencer. Employing the organismic analogy which was in vogue at the time, he explained the division of labor in society in terms of the relationship between aggregate size and structural differentiation:

> In societies, as in living bodies, increase of mass is habitually accompanied by increase of structure. Along with that integration which is the primary trait of evolution, both exhibit in high degree the secondary trait, differentiation (Spencer, 1895:459).

There has been recognized, he stated further,

> the general law that large aggregates have high organizations. The qualifications of this law . . . are numerous; but when

> made they leave intact the truth that for carrying on the combined life of an extensive mass, involved arrangements are required. So, too, is it with societies. As we progress from small groups to larger; from simple groups to compound groups; from compound groups to doubly compound ones; the unlikeness of parts increase. The social aggregate, homogeneous when minute, habitually gains in heterogeneity along with each increment of growth; and to reach great size must acquire great complexity (Spencer, 1895:459).

In summary, Spencer's account of differentiation in society reduced to an explanation based solely on increases in population size. Clearly, he suggests a universal association between size and differentiation.

The analysis of the division of labor in society by another classical theorist in sociology must be seen in large part as a reaction to the Spencerian view. Emile Durkheim also recognized the potential role of an increase in population size in bringing about further differentiation. But while he agreed that large aggregates may allow greater differentiation, he concluded that the factor of population size was only a necessary, not a sufficient, cause. In exposing what he considered a weakness in Spencer's conception, Durkheim called attention to certain "deviant cases" observed in the large, densely settled areas in China and Russia--areas characterized by homogeneity, a lack of differentiation. A division of labor had not evolved because social contact had remained segmented. If an increase in social volume determines social differentiation, it is only when accompanied by a corresponding increase in social density:

> . . . if the number of social units had influence on the division of labor, it is not through itself and necessarily, but it is because the number of social relations generally increases with that of individuals. But, for this result to be attained, it is not enough that society take in a great many people, but they must be, in addition, intimately enough in contact to act and react on one another. . . . The increase of social volume does not, then, always accelerate the advances of the division of labor, but only when the mass is contracted at the same time and to the same extent.

> Consequently, it is only an additional factor, but when it is joined to the first, it amplifies its effects by action peculiar to it, and therefore is to be distinguished from that (Durkheim, 1933:262-63).

At the group, rather than societal level of analysis, Georg Simmel examined forms of social action and structural arrangement as they derived solely from quantitative relationships. In his essay "Quantitative Aspects of the Group" (trans. in Wolff, 1950:87-177) he perceives one of the most abstract characteristics of the group, the mere number of its participants, to be the determinant of group form. In a review of this essay, Coser (1977:188) explains that

> In small groups, members typically have a chance to interact directly with one another; once the group exceeds a relatively limited size, such interaction must be mediated through formal arrangements. In order to come to grips with the increasing complexity of relationships among large numbers of individuals, the group must create special organs to help the patterning of interactions among its members. Thus, no large group can function without the creation of offices, the differentiation of status positions and the delegation of tasks and responsibilities.

In summary, ". . . the sociological structure of a group is essentially modified by the number of the individuals that are united in it" (Simmel, 1902:2).

As Terrien and Mills (1955:11) indicate, Simmel's conclusion is echoed implicitly in the Gemeinschaft-Gesellschaft formulation of Töennies and also in Weber's discourse on the ideal type of bureaucracy. In summary, then, the effects of size, in terms of number of members, upon human groupings and collectives have long been a general problem to sociologists--at least since the inception of the discipline. As the classical theorists cited above have indicated, size has been conceived as affecting the system of relationships among the differentiated activities performed by units of a group or population. In other words, group

or population size has been speculated to affect the exchange relationships, or structure, of the group or population. Accordingly, the issue of size may be properly considered a particular concern for students of social organization. Contemporary studies of the phenomenon have tended to ignore the question at the societal level and have focused instead on the formal and complex organization (e.g., Campbell and Abers, 1970; Hawley, 1965).

Within the studies of formal and complex organizations, as within the literature already cited, two general interests may be noted. One is with the effect of size on human conduct or human relations within the organization. The other also focuses on size as a structural characteristic of the organization, but as it affects (or at least is related to) other structural characteristics of the organization. As examples of the former, one may observe that size has been related to such variables as effectiveness, succession, job satisfaction, and membership participation (Merton, 1957:310-26; Grusky, 1961; Tannenbaum, 1961; Meltzer and Salter, 1962; Simpson and Gulley, 1962; Indik, 1963 and 1965; Berelson and Steiner, 1964:364-65). "But perhaps the greatest amount of theoretical and research attention has focused on the relationship between size and the administrative component as one structural aspect of formal organizations" (Campbell and Akers, 1970:435).

Studies of organization size, then, reflect the two general perspectives from which organizations are often investigated. Because of the nature of the investigation at hand, the distinction between these two perspectives is important both in setting the framework for the research and in introducing the object of analysis. According to Blau and Schoenherr (1971:4), the distinction lies in the contrast between two

fundamentally different questions. One question, as already indicated, asks how the various conditions in an organization affect individual conduct or human relations. The other question asks how the various conditions came to be and what are the interrelationships among them. On the one hand, the organizational characteristics are taken as given; and their influence on human behavior and informal groups is subject to analysis. On the other hand, the organizational characteristics are judged problematic; and an entirely different type of question is asked: what produced these characteristics to begin with? Or why do organizations develop some attributes rather than others? In other words, one question deals with individual and group behavior within the organization. The other question deals with the historical conditions and/or structural interrelationships which give rise to particular organizational features. The implications of these two approaches may also be contrasted in the distinctions between formal and informal organization.

Whenever groups of individuals associate and interact with one another, their behavior becomes socially organized. If this social organization is intentionally founded in order to accomplish certain objectives, rather than spontaneously emerging in the course of social interaction, then the organization may be considered formal. Particularly when a group is sufficiently large that direct social contact among all its members is limited, and the group has objectives requiring coordination of effort among its members, there is need for formally established rules, procedures, and division of labor. But not every aspect of the organization, or of the individuals of which it is comprised, can be formally regulated. General rules may not apply always to particular situations in an effective manner. Official procedures may not define

adequately the alternatives requisite in decision-making. As a result, informal and unofficial practices may emerge. Therein solutions may be provided for the problems of judgment posed by particular situations. And guidelines may be created for making decisions not anticipated by official procedures. Even quality of performance and quantity of production may come to be regulated by unofficial norms.

Within the formal organization, then, there may arise informal organizations. The constituent groups within the organization may develop their own norms, values, practices, and social relations in response to the officially designated rules and regulations, or lack of them as the case may be. Of course, the structure and occurrence of these informal aspects of the organization may not be determined solely by the formal institution. Other factors such as the background characteristics of the persons involved may also be important. Besides, the distinction between external structure and internal relations, and between formal and informal organization, imposes a false dichotomy on the nature of social action and interaction in any organizational setting. Social relationships cannot be comprehended in terms of the one or the other, but are always to be understood as embodying both. Sometimes the context of the situation may emphasize one aspect or the other. But always both are involved. To conclude otherwise would be to suggest that behavior is solely rational without any nonrational component, or vice-versa. Such a conclusion also would deny that social organization, of any form, cannot exist apart from the individuals who create it, share it, modify it, and are confined by it. The interest of this research, then, will not be in exalting external social structure over meaningful social interaction between individuals. Rather, the assumption is made that to

the extent that an external social reality may be conceived apart from individuals, it may be subjected to analysis in and of itself--as long as the reification involved is not mistaken for all of social reality or even as necessarily the most important aspect. With this assumption in mind, a further assumption which guides this investigation is that the formal organization may be considered tantamount in its influence on the individual in interaction within it in the sense that is provides the context for that interaction. As Perrow (1970:4) states in defending the social-structural approach to organizational analysis, ". . . people's attitudes are shaped at least as much by the organization in which they work as by their preexisting attitudes."

In keeping with the Weberian tradition followed by previous empirical research into the effects of size on formal and complex organizations, this investigation focuses on the external and formal structure. A summary statement of the perspective is offered by Kimberly (1976:571):

> The structuralist perspective has been central in the study of organizations. Influenced heavily by the work of Weber (1946), the structuralists generally have asked three separate, but related, questions. What are relationships among the structural characteristics of organizations? What are the determinants of variability in the structural characteristics of organizations? What are the consequences of structural variability for variability in organizational outcomes?
>
> In the course of seeking answers to these questions, which perforce require comparative research, the structuralists nearly always have assigned some role to one concept in particular --organizational size.

Relatively large groups (as opposed to groups small enough for their members to be in direct social contact) with goals which require coordination of differentiated activities tend to be explicitly organized. In these formally established organizations, an administrative staff usually exists to coordinate the activities of the members and to maintain the

organization as an operating system. Hence, the general question to which this research is addressed is how structural characteristics of organizations, such as size and the relative size of the administrative component, are interrelated. For example, as the number of organizational members increases, does the administrative component increase in a proportionate or disproportionate manner?

This question is examined both cross-sectionally and longitudinally among a sample of organizations which includes a variety of national voluntary associations, such as professional societies and the League of Women Voters. The major variables to be analyzed are: (1) size of the organization; (2) change in the size of the organization; (3) size of the administrative component; and (4) change in the size of the administrative component. In addition, a number of variables will be introduced to account for the effects of differentiation, or complexity, within the organizations. It is suggested that given two organizations of the same size, whatever difference there may be in the proportionate size of their administrative components may depend on the extent of organizational complexity within them. Such complexity would involve: (1) horizontal complexity, or the extent to which the organization is differentiated laterally (as indicated by the indexes of number of committees and number of publications); (2) change in horizontal complexity, as indicated by the numerical change in number of committees and in number of publications over time; (3) vertical complexity, or the extent to which the organization is differentiated from top to bottom (as indicated by the indexes of number of levels in the organization and the number of subunits; and (4) change in vertical complexity, as indicated by the numerical change in the number of levels and the number of subunits.

The foregoing variables will be interrelated in the following propositions:

1. The larger the organization, the smaller will be the relative size of the administrative component.

   1a. Introduction of vertical complexity as a control variable will increase the magnitude of the relationship between organization size and the relative size of the administrative component.

   1b. Introduction of horizontal complexity as a control variable will increase the magnitude of the relationship between organization size and the relative size of the administrative component.

2. As percentage change in organization size increases, the percentage change in the relative size of the administrative component decreases.

   2a. Introduction of percentage change in vertical complexity as a control variable will increase the magnitude of the relationship between percentage change in organization size and percentage change in the relative size of the administrative component.

   2b. Introduction of percentage change in horizontal complexity as a control variable will increase the magnitude of the relationship between percentage change in organization size and percentage change in the relative size of the administrative component.

Organization of the Study

The study is organized into six chapters. This first chapter has introduced the general framework within which the study will operate, stated the general purpose, and has set forth the hypotheses to be tested. Chapter II will involve a review of literature relevant to the study. This review is designed to examine the variety of findings to date with regard to the research question and the reasons for that variety. This examination should provide a foundation for the remainder of the investigation. Chapter III will review the theoretical bases for the research, the major propositions and their rationale, and

conceptualization of the variables. Methodology and analytic techniques are presented in Chapter IV. Included in this chapter will be a review of the sampling procedure, operationalization of the variables, a restatement of the hypotheses, and a review of the statistical procedures. Chapter V is concerned with the presentation of findings. Here, the hypotheses will be evaluated and secondary considerations will be offered. A summary of the investigation will be presented in Chapter VI, along with a discussion of what conclusions can be made from the findings presented in Chapter V. Limitations of the study will be addressed, as well as suggestions for research in the future.

CHAPTER II

REVIEW OF SELECTED EMPIRICAL INVESTIGATIONS

Introduction

Beginning with Melman's study of U.S. manufacturing industries in 1951, the relationship between organizational size and the administrative component has been a constantly recurring topic in books and journals. Although the preponderance of evidence has indicated a negative relationship between the two variables, there nevertheless have been studies which designate the contrary. Two of the studies reported in the literature even show inconsistent findings within themselves, depending on the manner in which the relevant variables are operationalized. Not only does the direction of reported relationships vary, but also the magnitude. Because of the heterogeneity of findings, there have been repeated warnings against drawing definite conclusions regarding the nature of the relationship between size and administrative component. As early as 1957, Caplow directed attention to the speculative quality of the literature which had been produced. Later, Starbuck (1965) continued to observe a paucity of research from which unequivocal judgments could be drawn. That same observation is currently valid. There remains a lack of theoretical development, a divergence of findings, and a number of methodological problems, not the least of which is how to define the major variables. Hence, a review of the literature is provided at this

point in order to reveal the controversial contents of the relevant publications.

Because of the pragmatic, atheoretical character of most of the literature, the following review consists entirely of empirical investigations. What theoretical work has been published will be reviewed in the next chapter. In this chapter, the material is organized primarily in a chronological fashion. One reason for this particular ordering of the chapter, though there are exceptions, is the tendency of studies reporting a positive relationship between organization size and the relative size of the administrative component to have been published relatively early in the history of the literature of the subject. Later research tends to show negative, or inverse, relationships. The major results will be examined, followed by a discussion of the sources of discrepancy in these results. Along with observations concerning other methodological problems, such as that of definitional dependency, this discussion will include a rather extensive inspection of the various operational definitions which have been employed, not only for the two primary variables but also for all the additional variables which have been introduced into the original relationship. Finally, the reported associations between the two primary variables and each of the control variables will be examined.

Early Speculation and Research

Although Melman (1951) initially found an inverse relationship, much of the early literature indicates a positive relationship between organizational size and the administrative ratio. In his first investigation, Melman analyzed census data on U.S. manufacturing industries

for the first half of the twentieth century. From his data, he concluded, "Large increases in average size correspond with relatively small increases in administrative overhead. The result appears regardless of the criterion used to measure size. . . ." Despite this initial finding of an inverse relationship, Melman (1954:31-2) later reported, for industrial firms in the United States and Great Britain, that an increasing proportion of the personnel are concerned exclusively with management and administration. And in a still later publication, he reported that during the period from 1907 to 1948, the number of administrative personnel per 100 production personnel in manufacturing firms in the U. S. and Great Britain rose from 8.6 to 20.0 (Melman, 1956:74). Further, he argued that the rise in administrative overhead not only failed to facilitate productivity but rather impeded it (1956:132-140). Picking up on this idea, C. Northcote Parkinson (1957:7) semi-seriously pointed to increasing administrative ratios as evidence of overbureaucratization. Because in most cases expansion of the administrative apparatus is implemented for the self-aggrandizement of the administrators, he suggested, the tendency toward overbureaucratization is inevitable. According to him, the number of administrators ". . . are more or less bound to multiply," regardless of the amount of work to be done.

Parkinson's Law, as his hypothesis came to be labeled, gained support when Theodore Caplow (1957) rather casually concluded, at the same time he referred to the over-abundance of speculation as opposed to empirical investigation concerning the issue, that the proportion of administrative workers increases with the size of the organization. He reflected the conception, popular at the time, of a positive relationship between the variables when he stated, "there is an almost universal

belief that the administrative and overhead components of any organization increase out of proportion to increases in its size" (Caplow, 1957: 7). Empirical support for this conception may be found in two investigations previous to Caplow's article. In their study of California school districts, Terrien and Mills (1955) found that a higher percentage of administrators is associated with larger, rather than smaller, districts. John E. Tsouderos (1955) provided data on ten voluntary associations and showed a positive relationship between size of the association and the relative number of administrative employees.

In summary, with the exception of the first investigation reported by Melman, early speculation and research tended to suggest that as organizations increase in size, the relative size of the administrative component increases disproportionately. At least as late as 1958, this conception continued to be evident when in a review of the relevant findings for industrial firms, Dubin (1958:366) concluded that "bigger companies need proportionally more people to manage and administer their affairs." However, a number of empirical studies have been conducted since 1951. And as stated earlier, the majority of these tend to indicate an inverse, nonlinear relationship between organizational size and the relative size of the administrative component.

Later Empirical Investigations

Including Bendix's study in 1956, there are seventeen empirical investigations through 1977 which indicated a negative relationship between organizational size and the administrative ratio. These investigations vary in the type of organization studied, the operationalization of variables and number of indicators employed, the type of statistical analysis,

and the number and types of variables utilized in addition to the two primary ones. At this point, a brief consideration of the various types of organizations studied will be undertaken along with a succinct examination of the findings.

Review of Investigations Indicating Inverse Relationships

Reinhard Bendix (1956:222) used data drawn from German industrial experience between 1907 and 1933. He showed that the percentage of administrative salary workers declined with increasing size of establishment for concerns with at least six employees. An investigation of four companies by Haire (1959) indicated, almost implicitly, a negative relationship between size and the staff-line ratio. Anderson and Warkov (1961) considered veterans administration hospitals, which they dichotomized into two categories--tuberculosis hospitals and general medical-surgery hospitals. In both categories, they found that the larger the hospital, the smaller the percentage of all personnel in administration. Lindenfeld (1961:23) examined 323 U. S. school districts and found that "the administrative components of organizations tend to decrease in relative size as organization size increases." Haas et al. (1963:14) measured their supportive component in two ways across a variety of organizations and found that ". . . the percentage of personnel engaged in supportive activities actually decreased as organizational size increased. . . ." When they replicated Haire's biological model, Draper and Strother (1963) found an inverse relation between the size of the educational organization under investigation and the relative numbers of top and middle management and supervisory personnel. Bernard Indik

studied five types of organizations: package delivery stations, automobile dealerships, volunteer fire companies, industrial labor union locals, and nonpartisan political organization chapters. In each type, he found ". . . a significant negative slope to the curves: as size of the local organizational unit increases, the supervision ratio declines" (1964:307). Looking only at the simple correlation between size of membership and the relative size of the administrative components, Raphael (1967) found a small but nevertheless inverse relationship (r=-.045) in her sample of labor unions. Rushing (1967) formulated four measures of the administrative ratio, all of which were negatively associated with the size of the industries (not organizations) in his sample. Tosi and Patt (1967) examined 36 U.S. Army hospitals and found a negative correlation between the mean percentage of administrative ratio and hospital size. Campbell and Akers (197) found a weak negative relationship between membership size and the relative size of the staff element in voluntary occupational associations. In a study of U. S. employment security agencies, Blau and Schoenherr (1971) discovered negative relationships between both of their administrative ratios (supervisory ratio and staff ratio) and organizational size. Hendershot and James made an inquiry into U.S. school districts and provided ". . . added evidence for a general negative relationship between organization size and the administrative-production ratio" (1972:152). Finally, Evers et al. (1976) studied farmer cooperatives and discovered relationships of -.42 and -.36 between size and relative size of administrative components.

As indicated previously, not all investigations conducted since 1956 have concluded clearly negative relationships between size and the relative size of the administrative component. Two articles may be

characterized as being inconsistent within themselves in their findings. For example, Rushing (1966) correlated six ratios (which may be considered administrative ratios) with two measures of size. Both the ratio of managerial to production personnel and the ratio of sales to production personnel were significantly and negatively correlated to each measure of size. But the clerical and professional ratios were positively related to the size measures. And the service ratio and total administrative ratio were related to the measure of size in opposite, non-significant directions. If the ratio of managerial to production personnel could be preferred as the most representative administrative ratio, one might conclude a negative relationship. On the whole, however, Rushing states that ". . . the relationship between firm size and relative size of the total administrative component appears to be small or non-existent" (p. 105).

A variety of results may also be gleaned from Holdaway and Blowers (1971). They analyzed forty-one Canadian urban school systems over two time periods, from 1964 to 1965 and from 1968 to 1969. Of the seven administrative ratios which they constructed, four were significantly related to each of the four measures of size in a negative manner; two showed non-significant correlations with each measure of size; and one showed consistent and significant positive correlations. Even though such findings may seem somewhat incongruent, Holdaway and Blowers summarized their results by stating that the larger school systems disclosed a stronger tendency toward smaller administrative ratios than did the smaller school systems, regardless of the definitions used for administrative ratio and system size.

Sources of Discrepant Findings

From the preceding overview of the research concerning organizational size and the administrative ratio, several inconsistencies have been pointed out regarding the findings. While the early research and speculation tended to promote a conception of a direct relationship between the variables, later investigations have posited the opposite: results predominantly indicate an inverse correlation. And two studies include both positive and negative correlations, as well as very weak and non-significant ones. Thus, from one study to the next, and even within studies, there exists a wide range in the degree of association between variables. Across the investigations reporting only negative relationships, for example, the range of correlations extends from a low of -.045 in Raphael's study to a high of -.925 in Indik's study.

In general, there appear to be three reasons why such discrepancies may occur. First, some of the sets of data may be inadequate in some way to test the hypotheses under discussion. Second, the various sets of data may not, in fact, be directly comparable. And third, the type of statistical analysis is not always the same: While some of the researchers use zero-order correlations, others present results derived from higher order correlations or other types of analysis.

As can already be seen, there may be some difficulty in comparing the investigations because of the variety of organizations included in the research samples. Hospitals, labor unions, voluntary associations, and industrial organizations, as well as others, may each present certain circumstances within themselves which would make research results incomparable, at least in a direct sense, to some degree. However, the vari-

ation in organizational settings is not likely to account for all the discrepancy in findings. For there exists sufficient discrepancy among studies performed on similar organizations to induce the researcher to focus on problems other than organizational variation, exclusively, in order to assimilate results.

Perhaps some explanation for discrepant results also may be attributable to the manner in which the two variables, organizational size and administrative component, have been operationally defined. One might anticipate that organizational size, for example, would be defined simply as the total number of members in the organization. But in the studies which have been cited, only ten incorporate such a definition. Definitions of the administrative component are even more evidently diverse. Because of the differences in operationalizations, a review of the definitions will be presented shortly. At this point, however, a further note should be made: not only the variety of definitions has been suggested as a possible cause of inconsistent findings, but also the dependency of the definitions. Freeman and Kronenfeld (1973) point out that the common methodological procedure used in investigating the effects of organization size on the relative size of the administrative component involves the correlation of two variables which are not independent of each other. For example, organization size may be defined as the number of administrators plus the number of production workers (A+P). The relative size of the administrative component, then, may be defined as the ratio of the number of administrators to the number of production workers (A/P). Because both definitions contain the same components, a spurious correlation may be anticipated between them.

This means that many of the findings reported in the literature may be questionable.

An example of the variations in findings which may be produced through differences in zero- and higher-order correlations may be derived from Blau and Schoenherr (1971:90-92). Their initial zero-order correlations reflect coefficients of -.45 for the relationship between agency size and the supervisory ratio and -.60 for the relationship between agency size and the staff ratio. However, through multiple regression techniques, they sort out the effects of other factors and produce standardized regression coefficients of beta weight = -1.13 and beta weight = -1.04, respectively, for the same two relationships. By so doing, they reveal the difference in the over-all influence of size on the relative size of the administrative component, as represented in the zero-order coorelation, and the direct effect, as represented by the higher-order correlations. At the same time, they reveal a need for controlling other variables when examining the association between size and the administrative ratio.

Operational Definitions

Operational Definitions of Organizational Size

As stated earlier, only ten inquiries have considered simply the total number of members of the organization as the operational definition of size. Among the remaining studies, size is variously defined even among those using similar data samples. For instance, Terrien and Mills (1955), Lindenfeld (1961), Holdaway and Blowers (1971), and Hendershot and James (1972) all investigate school systems. Yet they each employ different operational definitions of size. Terrien and Mills (1955:12)

indicate that the total number of employees per school district constitutes their size measurement. In a replication of Terrien's and Mill's study, Lindenfeld (1961:21) classified his school systems arbitrarily into "six roughly equal groups" according to a definition of size based on total professional staff employed. Holdaway and Blowers (1971:281) defined their variable, system size, in four ways: (1) number of schools, i.e., the number of service locations; (2) number of pupils, i.e., the number of clients; (3) number of professional and administrative staff in the system, i.e., central office administrative and professional personnel plus school principals plus classroom teachers; (4) number of classroom teachers, excluding principals. Hendershot and James (1972:150) justify their operationalization of size by stating,

> We take student enrollment as the measure of system size merely because the total number of employees of all types is not furnished. Assuming that the number of employees is directly related to the number of students in the system, the enrollment is satisfactory for our purposes.

The study of industrial organizations also indicates dissimilarities in operationalizing size. Melman's (1951) initial investigation includes such diverse definitions as total production personnel, total assets, average number of wage earners per establishment, average sales added by manufacture per establishment, and net sales. Both of Rushing's studies (1966 and 1967) utilize the ". . . mean number of <u>production personnel</u> per firm in each industry . . . computed by dividing the total number of production personnel by the total number of firms per industry" (1966: 105). In the 1967 publication, he stated that

> Since the complexity-administrative growth hypothesis posits that administrative personnel exist to solve problems of coordination among production personnel, the appropriate measure of industry size is obviously the total number of craftsmen, operatives, and laborers in each industry" (p. 279).

One of the examinations of hospitals disclosed a dissimilar definition of size. Anderson and Warkov (1961:25) explained two measures of the variable. However, they resorted to only one in their study: Annual Average Daily Patient load was derived from statistical summaries published monthly by the Central Office of the Veterans Administration. Sufficiently high correlations (.966 and .977) were claimed between this measure and the alternative, total hospital labor force, that the latter was not employed throughout the study.

Operational Definitions of the Administrative Component

Among definitions and measurements of the administrative component, one may observe a considerable amount of divergence and ambiguity. As Haas, Hall, and Johnson (1963:11) suggested, discrepancies in investigative results may be traced at least in part to ". . . the ambiguity of such terms as 'administrative personnel' and the 'line' versus 'staff' distinction." Terrien and Mills (1955:12), for example, in their definition of the administrative component, included ". . . the superintendent, his assistants and immediate staff, principles, business managers and the like" (emphasis added). While they may have followed a consistent pattern of applying this definition in their research, they did not clarify just what "the like" entails. Haire's (1959:288) staff-line distinction also lacked clarity: "The 'line' includes those who directly make and sell a product; the 'staff' includes those who provide specialized support, advise, and help." Haire recognized the inherent problem of dichotomizing a continuous or multivalued variable when he stated that "in borderline cases the proximity to the product and direct control

over it were determinative." Nevertheless, the problem of definition remains. One may easily argue in this case whether the administrative component was correctly represented. The line category may include a number of personnel who would be considered administrative. Moreover, as Haire (1959:288) concluded himself, "in industrial practice there seems to be no uniformity in the use of the terms."

Another problem, somewhat related to ambiquity, is the inapplicability of definitions of the administrative component across organizational types. As Haas, Hall and Johnson state, "A distinction which is meaningful for industrial firms may have little relevance for governmental and religious organizations" (1963:11). A conspicuous example may be cited from Anderson and Warkov (1961:25) wherein the administrative component is defined as ". . . the percent of all employees classified in the category, 'General Hospital Administration'," as ". . . based on the table reporting full-time equivalent hospital personnel employed in VA hospitals, Supplement, VA Statistical Summary" (25f). Such a definition appears to be closely tied to the nature of the organization and may be difficult to apply, for instance, to Rushing's manufacturing industries. At any rate, there appears to be some evidence that the definitions of the administrative component may be problematical. Consequently, there follows a review of those operationalizations which have been employed.

Among studies of industrial organizations, the line-staff definition employed by Haire has already been cited. Similar to Haire in their use of a dichotomized definition are Melman (1951) and Bendix (1956). Both merely categorized organizational members as either salaried or wage earners. Later, Rushing (1966) attacked the use of such heterogeneous

categories on the grounds that not all segments of administration react to changes in size in the same way. Accordingly, he used United States Census of Manufacturer and Occupation by Industry data to decompose the administrative component into more homogeneous units (such as managerial, clerical, professional, sales, and service units) in order to determine what effect size fluctuation had on each.

Investigations of educational systems have also included attempts to decompose the often heterogeneous concept of the administrative component. Holdaway and Blowers (1971:280-281) separated the component into the more precise "multiple definitions" of: (1) central office administrative personnel--staff not directly involved with students but concerned more with planning, organizing, coordinating, etc; (2) central office professional personnel--psychologists, social workers, teaching consultants, etc.; and (3) central office administrative personnel plus principals. While Lindenfeld (1961:22) reports a measure to total administrative staff, also broke down this category into four constituent parts: (1) top administrators--including superintendents, assistant superintendents, and other administrative staff except clerks; (2) principals; (3) supervisors--including personnel devoted to supervision of instruction in special subjects or grades; and (4) teachers--including vice principals, department chairman, and various nonsupervisor instructional staff such as librarians and counselors. Instructional staff were excluded.

Other examinations of school systems contained single definitions which were not so differentiated. The administrative component devised by Terrien and Mills (1955) is one example. Another, although not so inclusive as that of Terrien and Mills, was the component created by

Hendershot and James (1972), who included only principals and supervisors. Hawley, Boland, and Boland (1965) defined their administrative component merely as the number of professional administrators, expressed in full-time equivalents, in the colleges and universities they investigated.

Besides the Anderson and Warkov (1961) study of Veterans Administration hospitals, another study of hospitals also included a large heterogeneous category as the administrative component. Tosi and Patt (1967: 164) were concerned with the personnel comprising whole offices of administration--such as the offices of the facility commander and the comptroller; the office of internal finance, accounting, and data processing services; the personnel administration office; the office of medical reports and records; the nursing administration office; the medical library staff, etc. Presumably, the personnel in these offices included clerical and staff employees, as well as administrators per se. In fact, with the exception of custodians and the patients themselves, this definition apparently included everyone in the hospital who did not spend most of his or her time in activities directly concerned with the patients.

The development of a generally acceptable and broadly applicable definition of the administrative component was a major purpose of the study by Haas, Hall, and Johnson (1963). Yet the definition they developed was as heterogeneous and expansive as the one used by Tosi and Patt. Their "supportive" component consisted not only of administrators but also custodians, clerks, truck drivers, etc. Everyone is included who was " . . . engaged in activities which contribute indirectly to the attainment of organizational goals" (p. 12). Consequently, the members

of an organization may be dichotomized into "direct" versus "supportive" categories. In making such a dichotomy, Haas, Hall, and Johnson created a definition which seems to represent the administrative component about as well as the line-staff categories used by Haire, of whom they were so critical.

With the exception of Tsouderos (1955), who provided no description of his administrative component, and Raphael (1967), whose operationalization will be discussed momentarily, the remaining researchers have provided fairly lucid definitions. Indik (1964:302) used a supervisory component which was defined as ". . . those individuals whose functional role involved mainly direct interpersonal supervision or key organizational administrative decision making." He excluded non-rank-and-file personnel who serve mainly clerical functions. Blau and Schoenherr (1971) also were concerned with supervisors, whom they defined as anyone who supervises two or more subordinates. Finally, Campbell and Akers (1970:437-8), in their study of voluntary occupational associations, included ". . . all employees (and equivalent volunteers) to whom associational members usually refer as 'staff,'" or in other words, ". . . all administrative, clerical, technical, professional, and kindred employees of the association."

The Raphael (1967:771-2) definition and measurement of the administrative component is considered at this point, first, because it is unique and therefore requires inspection apart from the others, and second, because it serves to introduce a review of other computations of the administrative ratio which vary from those found in the majority of the research. Because she perceived that the labor union locals in her sample were ". . . voluntary associations where persons often do not act

upon the duties attached to offices to which they are elected," she attempted to construct ". . . a measure of the size of a local union's active administrative component, rather than of its formally designated one." One assumption which underlied the consequent measurement procedure was that labor union organizations are pyramidal in structure. At the top are a relatively small number of high-ranking, executive level administrators. In the middle are a larger number of union officials such as committeemen and stewards. And at the base are the union members. If, then, the day-to-day administrative decisions are predominantly made by the high-ranking officials, the active administrative component would be relatively small. On the other hand, if the decisions are predominantly made by the lower-ranking officials, the active administrative component might be relatively large. In order to locate the position in the pyramid where most of the decisions are made, a mean official level was determined for each local union from coded responses to questions of "Who does most of the work?" in connection with each of eight different day-to-day administrative tasks common to labor unions. One problem regarding the resultant measure was whether it adequately reflected the administrative component. Conceptually, the measure was not designed to indicate the size of the administrative component by number of members. Empirically, no correlation was offered to describe how this measure may be associated with the more common ones. Consequently, there is some problem in determining just how Raphael's component is expected to be affected by variations in organizational size. The finding of such a small negative correlation as -.045 may have resulted largely from the manner in which the variable was operationalized.

Besides Raphael, there were several other investigators who computed

administrative ratios by methods at variance with the majority of research. From one computation to another, the difference to be noted is found in the denominator. Most often, the administrative component, however determined, was divided by the total number of members in the organization. However, in the studies to be cited, different denominators were employed. Melman (1951), for example, divided the administrative component by the total number of production personnel instead of the total personnel. Rushing's (1966 and 1967) administrative ratios were also computed by dividing the total number of production personnel. Hawley, Boland, and Boland (1965) computed their ratio by dividing the administrative component by the total number of faculty. Similarly, Hendershot and James (1972) divided the number of supervisors and principals by the number of teachers instead of by the total number of students, teachers, and administrators. In another study of school systems, Holdaway and Blowers (1971) employed four different denominators in constructing seven different ratios. The various measures of the administrative component were divided by: (1) the number of pupils, (2) the number of schools, (3) the number of professional and administrative staff, or (4) the number of classroom teachers. Finally, one of the two ratios calculated by Blau and Schoenherr (1971) was distinct from the others. Their staff ratio was determined by the percentage of total personnel time devoted to staff and technical activities.

Incorporation of Additional Variables

Attempts to resolve inconsistencies among findings concerning the relationship between the primary variables of size and the administrative ratio have led to the incorporation of additional variables into a number

of the research designs. As Campbell and Akers (1970:435) stated, ". . . a clearer understanding of the size factor, especially as related to the administrative segment, requires a systematic investigation into other structural features of organization." As they appear in the literature, these structural features may be generally categorized as complexity, or differentiation, variables. They have included horizontal differentiation, vertical differentiation, spatial differentiation (or dispersion), and task differentiation (or division of labor). However, not only factors reflecting structural characteristics have been included, but also there has been some concern with several other types of variables, including age, growth, institutional resources, and institutional quality. As will be seen, each of the additional variables with the exception of the last two, were operationalized in several ways.

Anderson and Warkov (1961) were the first to explore the effects of complexity on the relationship between size and the administrative component. Assuming that such a dichotomy reflected a difference in organizational complexity, they divided their sample of VA hospitals into two groups, general hospitals and tuberculosis hospitals, according to the diversity of illnesses involved. The general hospitals were considered more complex than the tuberculosis hospitals because they handled not only tuberculosis cases but also a wide variety of other diseases as well. While such a measure was rather simple in design and may be questioned because it lacks empirical validation, it nevertheless appeared sufficiently sensitive to produce a significant indication that the ratio of administrative personnel decreased with the hospital's size but increased with its complexity.

Horizontal Differentiation

Subsequent to the research of Anderson and Warkov, attempts have been made to utilize the complexity variable in a less ambiguous manner. Within these attempts, complexity as a variable has been delineated more specifically in its various forms. One of these forms is horizontal differentiation. Illustrative of some of the variations in operational definitions of this concept are the following quotations:

> The number of departments and non-departmentalized schools serves as an index, albeit a crude one, of the diversity of programs or lines of activity pursued, or, in other words, complexity (Hawley, Boland, and Boland, 1965:253).

> Horizontal complexity . . . refers to the extent to which there are differentiated activities and divisions at one specific level -- the national office of the association. This is measured in two ways: (a) the total number of division, councils, committees, and sections at the national level, and (b) the number of different periodical publications put out by the national association (Campbell and Akers, 1970:438).

> . . . the number of major subdivisions [is] the main indication of horizontal differentiation, and the number of sections per division [is] another indication of horizontal differentiation (Blau and Schoenherr, 1971:16).

Thus, across three different types of organizations--four year colleges and universities, voluntary occupational associations, and employment security agencies, respectively--three different operationalizations were created for the concept of horizontal differentiation.

Vertical Differentiation

Another form of structural complexity is vertical differentiation. Campbell and Akers (1970:438-9) defined this variable as ". . . the extent to which there is differentiated 'depth' or organization 'penetration' below the most inclusive national level." The two measures of

such depth and penetration were

> a) the total number of regional, state, and local subunits within the association, and b) the lowest level--national, regional, state, or local--to which the organizational ties penetrate. The two measures are used because an organization that includes three or four different levels (national, regional, state, and local) is more vertically differentiated than one which has no additional levels below the national (Campbell and Akers, 1970:438).

But even so,

> an organization which theoretically has ties down to the country or even municipal level but really has only state societies in half the states and organizations in only a handful of counties within those states should be considered actually less vertically complex than the association which has several regional divisions, associations in every state, and all or most counties organized within those states (Campbell and Akers, 1970:439).

Blau and Schoenherr (1971:16) also utilized a variable of vertical differentiation, operationalized as the number of hierarchical levels within the employment security agencies.

Spatial Differentiation

Still another form of complexity which has received attention is spatial differentiation. Anderson and Warkov (1961:27) appear to have focused attention on this variable when they proposed that "the relative size of the administrative component increases as the number of places at which work is performed increases." In the first test of this proposal, Lindenfeld (1961:22-23) sustained the hypothesis by presenting data which ". . . indicate that the larger the number of schools operated within school systems of a given size, the larger the relative size of the administrative component." Since Lindenfeld published his finding, two subsequent investigations reflect continued interest in spatial differentiation. Among their efforts to provide clear conceptions of organizational characteristics, Haas, Hall, and Johnson

(1963:14) defined the variable as ". . . the number of physical locations apart from the central office which were staffed and maintained by the organization. . . ." Lastly, from a somewhat different perspective than the foregoing, Raphael (1967:770) referred to ". . . the number of spatially separated places at which the members of a local union are employed."

Task Differentiation

The fourth complexity variable to be considered is the division of labor, or task differentiation. Although Rushing (1967:274) claimed that he was the first to provide any empirical evidence concerning the division of labor and the administrative ratio, he was predated by Haas, Hall, and Johnson (1963), who in turn were presaged in this matter, as they admit and provide credit for, by Anderson and Warkov (1961). It seems that the latter were responsible for stimulating interest in this variable when they proposed that "the relative size of the administrative component increases as the number of tasks performed at the same place increases (or as roles become increasingly specialized and differentiated) (Anderson and Warkov, 1961:27). Two years later, while they failed to confirm this proposition, Haas, Hall, and Johnson (1963:15) did provide some empirical evidence concerning the division of labor, which they justified as task differentiation. In their operationalization of the variable, ". . . the organizations were dichotomized into those which had only one major activity and those which had more than one major activity." Raphael (1967:770-1) also resorted to a rough approximation of the division of labor, which she labeled "diversity of member's occupations." This variable was operationalized as a dichotomy which

distinguished between craft unions and industrially organized unions, with the latter being the most occupationally diverse. (Parenthetically, one might note that the occupational diversity measured by Raphael does not refer to the object organizations of her study, but rather to the diversity of occupations in which the organization members are engaged outside those organizations per se. In other words, a bricklayer for a construction company is not a bricklayer for the occupational union of which he is a member. Therein, he may be a steward or some other official or regular member with certain designated responsibilities. But in the union itself, his activity is not laying bricks; therefore, he requires little administrative coordination from the union in this respect.) ". . . based on how evenly production personnel are distributed throughout the total number of production occupations," Rushing's (1967:279-283) measure of the division of labor was not concerned with structural parts per se, but rather with "the distribution of individuals among the structural parts." As indicator of this distribution was derived from the formula developed by Gibbs and Martin to indicate the division of labor in societies. Contrary to Rushing, Blau and Schoenherr (1971:17) emphasized structural parts instead of individuals when they defined the division of labor as the number of different job titles.

Age, Growth, Resources, and Quality

The preceding paragraphs have described the various definitions and measurements of the four dimensions of structural complexity in organizations. But as stated earlier, some attention has been focused on additional variables other than those reflecting structural factors. For example, the age of the organization was incorporated as a variable in

the investigations of Melman (1951), Haire (1959), and Haas, Hall, and Johnson (1963). In all three studies, age indicated the number of years since the organizations were founded.

A second variable which has been utilized is organizational growth. Melman (1951) viewed growth as the percentage change in organizational size. Haire (1959) was interested in comparing proportional changes in the line and staff components as the four organizations in his sample increased in size. A third definition was ". . . the proportional (%) increase in student enrollment . . ." during the number of years covered in the research of Hendershot and James (1972:150).

Two variables not examined by others, institutional resources and institutional quality, were studied by Hawley, Boland, and Boland (1965: 253). Referring to the former, they stated, "Operating budget size obviously measures an institution's resources, or its ability to acquire the wherewithal to provide academic services." The latter variable was operationalized as ". . . the percentage of faculty with Ph.D. degrees."

Findings Generated by Additional Variables

For the most part, research findings generated through the inclusion of additional variables such as complexity, age, growth, resources, and quality have been more consistent than those obtained simply by measuring the association between only the primary variables. Beginning with Anderson and Warkov (1961), results predominantly have indicated a positive association between organization size and the various measures of complexity. As stated previously, Anderson and Warkov assumed that General Medicine and Surgery Hospitals were more complex than Tuberculosis Hospitals. With this assumption in mind, they sought to establish

whether there was a relationship between type of hospital and organizational size. While they failed to report any measure of association, they nevertheless concluded that "the data indicate that the GM&S hospitals are significantly and substantially larger than are the TB hospitals. In 1956, the mean size of the GM&S hospitals was 770 and only 335 for the TB hospitals" (p. 26). Thus, they provided the first sign of a positive relationship between organizational size and complexity.

Complexity Variables and Organizational Size

After Anderson and Warkov published their findings, five studies continued to research the size-complexity relationship. Unlike the initial investigation, they contained more specific delineations of the complexity variable into its various forms and reported measures of association between size and the indicators of each dimension. The results are summarized in Table I. As the table indicates positive associations persist in all but one study. The discrepant results were obtained by Raphael (1967:773), who found a weak negative correlation of -.157 between size and the diversity of occupations represented by each union in her sample.

Complexity Variables and the Administrative Ratio

Concerning the association between complexity and the administrative ratio, the research findings again predominantly indicate a positive relationship, though this tendency is not so clearcut as in the case of complexity and organization size. Among the eight studies concerned with the problem, six reported positive associations. However, two of these investigations showed this relationship only after the effects of

TABLE I

REPORTED RELATIONSHIPS BETWEEN COMPLEXITY VARIABLES AND SIZE

Complexity Variable	Study	Indicator of Complexity Variable	Coefficient Obtained
Horizontal Differentiation	Campbell and Akers (1970)	1. Number of Committees, Sections or Councils	Gamma = .49
		2. Number of Publications	Gamma = .40
	Blau and Schoenherr (1971)	1. Number of Divisions	r = .55
		2. Number of Sections per Division	r = .43
Vertical Differentiation	Campbell and Akers (1970)	1. Number of Regional, State, and Local Subunits	Gamma = .67
		2. Lowest Level of Penetration	Gamma = .49
	Blau and Schoenherr (1971)	Number of Hierarchical Levels	r = .73
Spatial Differentiation	Haas, Hall, and Johnson (1963)	Number of Locations	rho = .676
	Raphael (1967)	Number of Locations in which Union Members Work	r = .574
Task Differentiation	Raphael (1967)	Diversity of Occupations Represented by Union	r = -.157
	Rushing (1967)	Distribution of Production Personnel throughout Total Number of Production Occupations	rho = .24
	Blau and Schoenherr (1971)	Number of Job Titles	r = .78

organization size were controlled. The remaining two studies reported no significant relationship and a negative relationship, respectively. In summary, then, the majority of the reported associations indicate positive relationships. But because of the apparently diverse nature of the findings, a simple summary statement concluding such a relationship would be somewhat misleading and would overlook the suggestions of interaction effects which arise between size and complexity as they affect the relative size of the administrative component. Therefore, the relationships which have been reported between complexity and the administrative ratio will be examined independently by dimension of complexity and by study.

The initial report on the association between complexity and the administrative ratio suggested no significant relationship. Anderson and Warkov (1961:26) at first found no difference with respect to the proportion of personnel in administration in GM&S hospitals and TB hospitals. Both types contained "about 12.5 per cent" administrative employees. However, when size was controlled, they found that the TB hospitals averaged 11.1 per cent of personnel in administration while the GM&S hospitals averaged 14 per cent. This difference reportedly was significant at the .01 level.

Horizontal Differentiation and the Administrative Ratio

Reports regarding the effects of horizontal differentiation on the administrative ratio have been provided by Hawley, Boland, and Boland (1965), Blau and Schoenherr (1971), and Campbell and Akers (1970). The first of these studies found that ". . . the ratios decline as complexity,

or the number of departments and non-departmentalized schools increases . . ." (Hawley et al., 1965:253). Yet, as with Anderson and Warkov, when size was controlled, increases in complexity yielded increases in administrative ratios. Thus, although no measures of association were supplied, it is apparent in this case that controlling for the interaction between size and complexity resulted in a positive relationship between complexity and the administrative ratio. Similarly, the second study cited also found that size had a mediating effect on the complexity-administrative ratio relationship. Initial negative associations found in zero-order correlations between the supervisory ratio and number of divisions, and between the supervisory ratio and number of sections per division, became positive through multiple regression techniques, in which the effects of size were removed. The same was true for the relationships between the staff ratio and the complexity measures. With regard to the supervisory ratio, the initial zero-order correlation coefficients were -.20 and -.04, respectively. But the standardized regression coefficients were .36 and .33. The zero-order correlation coefficients for the staff ratio were -.31 and -.18. The standardized regression coefficients were .21 and .18 (Blau and Schoenherr, 1971:91-92). The third study reported findings of the same nature. Weak positive associations were indicated between both measures of complexity and the administrative ratio. The gamma coefficients were .21, regarding the number of committees, sections, and councils, and .15, regarding the number of publications. Both of these coefficients were boosted in value when size of the association was held constant (see Table 11 in Campbell and Akers, 1970:447).

Vertical Differentiation and the Administrative Ratio

While one investigation found a negative association between vertical differentiation and the administrative ratio, the other reported a positive association. Weak negative coefficients were shown by Campbell and Akers (1970:444-447) in reference to the relationship between both measures of vertical differentiation (the number of regional, state, and local subunits and the lowest level of organizational penetration) and the relative size of the administrative component. The gamma coefficient associated with the first was -.14 and with the second, -.11. When size was controlled, the gamma values remained negative, with one exception in which the value was positive yet quite small. These values are presented in Table II. From these data, Campbell and Akers concluded that ". . . the administrative component relates only slightly or negatively to vertical complexity . . ." (p. 446).

Contrary to the conclusion of Campbell and Akers, the other study which inspected the effects of vertical differentiation on the administrative ratio concluded a positive association. Initially, Blau and Schoenherr (1971:90-92) found negative relationships between their supervisory ratio and the number of hierarchical levels ($r = -.18$) and between their staff ratio and the number of hierarchical levels ($r = -.33$). After they employed multiple regression techniques, however, direct positive associations were revealed. The standardized regression coefficient for the supervisory ratio and number of hierarchical levels was .47. The coefficient for the staff ratio and number of hierarchical levels was .33.

TABLE II

GAMMA COEFFICIENTS FOR RELATIVE SIZE OF THE ADMINISTRATIVE COMPONENT BY MEASURE OF VERTICAL DIFFERENTIATION, CONTROLLING FOR MEMBERSHIP SIZE*

Membership Size	Vertical Differentiation	
	Subunits	Level of Penetration
Under 2,000 Members	-.05	.03
2,000 to 15,000 Members	-.04	-.06
15,000 or More Members	-.38	-.28

*Adapted from Campbell and Akers (1970:447, Table 11).

Spatial Differentiation and the Administrative Ratio

The effects of spatial differentiation on the administrative ratio appear to have been empirically investigated first by Lindenfeld (1961: 22-23). When he controlled for the size of the school systems in his sample, he found that ". . . the larger the number of schools operated within school systems of a given size, the larger the relative size of the administrative component." Other studies have shown different results. Haas, Hall, and Johnson (1963:14-15) found a negative rank order correlation between their two measures of the supportive component and spatial dispersion (rho=-.13 and rho=-.18). Among only those organizations with more than one location, the correlations were -.09 and -.35. None of these correlations were found to be statistically significant, however, Raphael (1967:773) also discovered a negative relationship: When size of organization and diversity of occupations were held constant, the relative size of the administrative component continued to show a decrease as the spatial dispersion of the organizational members increased. The beta regression weight in this case was -.246.

Task Differentiation and the Administrative Ratio

While the relationships reported between spatial differentiation and the administrative ratio have been negative for the most part, those reported between division of labor and the administrative ratio have been positive with one exception: Haas, Hall, and Johnson (1963:15) concluded that "in the organizations studied, performance of more than one major

organizational task is not significantly related to an increase in the size of the supportive component." Positive relationships were established by Rushing (1967:283-89), Raphael (1967:773) and Anderson and Warkov (1961:27). In summary, there appears to be some confirmation of the latter's finding that "the relative size of the administrative component increases as the number of tasks performed at the same place increases . . ." (Anderson and Warkov, 1961:27).

Discussion of Discrepant Findings

In general, those studies which have included variables of structural complexity tend to have indicated a positive relationship between size and complexity and between complexity and the relative size of the administrative component. Still, discrepant findings do exist, these must be explained if a consistent set of generalizations is to be realized concerning relationships between organizational variables. Without empirical investigation, of course, any attempt to render such an explanation would be merely speculative. Yet, the existence of discrepant findings would seem attributable to three factors: (1) differences in operational definitions, (2) differences in the nature of the organizations under investigation, and (3) possible methodological limitations.

The Haas, Hall, and Johnson (1963) found a negative, though not statistically significant, relationship between spatial differentiation and the administrative ratio may well have been the result of their definition of the administrative component. In order to provide a "generally acceptable and broadly applicable definition of the administrative component," they create a "supportive component" which includes "those persons engaged in activities which contribute indirectly to the attain-

ment of organizational goals" (p. 12). This component, then, included such nonadministrative personnel as truck drivers, custodians, clerks, etc. Rushing (1966:101) stated that while this definition

> . . . at least makes explicit what is to be included and not included in the category (provided the criteria of direct and indirect activity can be achieved), it nevertheless puts in the same category personnel whose roles and functions differ in important ways.

Such a heterogeneous definition avoided or at least confused, the theoretical question involved; for after all, the object of concern has not been an organization's janitorial service. Moreover, as Rushing suggests, the amorphous nature of the supportive component would be methodologically limiting.

Another definitional and methodological problem may be found in Haas', Hall's, and Johnson's (1963:9-17) indicator of the division of labor. First of all, the organizations were merely dichotomized into two categories--those with only one major activity and those with more than one major activity. Because the authors failed to indicate what constituted a "major activity," such a dichotomy is perplexing. Is one really expected to believe, as they indicated, that an electrical equipment manufacturer employing 3,096 persons had only one major activity? If so, this one activity must have been simply the construction of electrical equipment. But if this line of reasoning were followed, the one major activity of an auto dealership would have been selling cars. Yet, Haas, et al., indicated that the auto dealership in their sample had three major activities, not just one. While it may be possible, it does not seem probable that an auto dealership which employed 237 persons would have had a greater division of labor than an electrical equipment manufacturer which employed more than three thousand. A

further problem may be noted in that among a sample of thirty organizations the most complex were measured as having only three major activities. Then, the organizations were dichotomized into categories of those with only one and those with more than one major activity (with the size of each resulting category approximately equal in numbers). Because of the conceptualization of the variable, which was at odds with the traditional view of the division of labor, and the insensitivity of the resulting measurement, it seems reasonable that the findings would be non-significant, if not insignificant.

The weak negative correlation found by Raphael (1967) between size and the division of labor may have been produced by her definition of the latter variable, which was discussed earlier. Similarly, the negative correlation she found between spatial differentiation and the administrative ratio may have been affected by her definition of the administrative component. In addition, she pointed out that the differences in her findings and the expected findings may have been attributable ". . . to the fact that in essential structural features, labor unions probably are best described as voluntary associations" whereas other investigations ". . . have referred to business or service organizations" (p. 775).

Campbell and Akers (1970:448) also felt ". . . the explanations lies in the nature of voluntary organizations. . . ." Because the subnational units of the occupational associations which comprised their sample had a voluntary, relatively autonomous relationship with their national offices, thus negating the national offices' authority to coordinate the subnational units or to be responsible for their staffing, the administrative staffs at these lower levels were not considered part

of the overall associational administration and were not reported as such. Consequently, the data did not include them. But it may have been that ". . . if both national and lower-level staff were counted, the size of the administrative component would have been positively related to vertical complexity" (Campbell and Akers, 1970:448). Nevertheless, the nature of the organizations continues to be problematic. If the lower levels of the voluntary associations were less autonomous, their relationship to the national offices possibly would more closely approximate the nature of the relationship between higher and lower level units of business and corporate organizations, wherein a positive association would be expected between vertical complexity and the administrative ratio.

Consistent with indications that size tends to be positively related to complexity and that complexity tends to be positively related to the administrative ratio, Blau and Schoenherr (1971) offered data which provided still another possible explanation for the existence of negative correlations between measures of complexity and the administrative ratio. Although they originally found a negative association between vertical differentiation and the administrative ratio, a closer examination revealed a positive direct effect. The positive association was uncovered after the effects of size were removed through multiple regression techniques. Size and vertical differentiation tended to be positively related in their study. Yet the two variables had oppositely directed effects on the relative size of the administrative component. Increasing size tended to be associated with decreases in the administrative ratio while increasing vertical differentiation tended to be associated with increase in the administrative ratio. Even so, the

negative effects of size were such that they more than compensated for the positive effects of vertical differentiation.

Unless size is controlled, it tends to produce a negative association between complexity and the relative size of the administrative component. A statistical method, then, which fails to differentiate this condition and remove the spurious effects of size may supply a negative correlation between vertical differentiation and the administrative overhead. Multiple regression techniques appear to overcome this obstacle.

Additional clarification concerning the overall relationship between size, complexity, and the administrative ratio may be derived from a slightly different perspective. The direct effect of size is to reduce the relative size of the administrative component. But the direct effect of size also is to increase complexity. And complexity tends to increase the administrative ratio. Thus, while size directly affects the administrative ratio in a negative manner, it has an indirect effect of increasing the ratio. Or in the words of Blau and Schoenherr (1971: 90):

> Large size, by giving rise to differentiation in the structure, indirectly raises the managerial ratio and thereby counteracts its own direct effect of reducing it. As a result, the over-all influence of size on the supervisory ratio is far less ($r = -.45$) than its direct effect ($b^* = -1.13$). . . .

Age, Growth, Quality, Resources, and Size-Administrative Component

Other than variables reflecting structural complexity, additional variables which have been incorporated into investigations of size and the administrative ratio include age, growth, organizational quality, and organizational resources. Melman (1951), for example, considered

the possibility that the size of the administrative component may be related to the age of the organization. But he found no relationship. Both age and growth were matters of concern for Haire (1959:288-289, 292). Although each company in his sample was composed almostly entirely of line personnel when first founded, beyond this date they each showed ". . . a rapid shift toward a higher proportion of staff, and the first six to ten years in each firm showed a steep increase in the percent of staff until the figures stabilized," ". . . two of the firms stabilize at about fifty percent devoted to staff, and two at about twenty-five percent." Thus, the staff grows rapidly in each firm during the first six to ten years and then levels off. Concerning growth, Haire compares the growth of line personnel to the growth of staff personnel during certain periods of time. Accordingly, he reports that "in the early years, while the line grows linearly, the staff grows by some exponential function. . . . Later, in another period of growth, they grow at quite similar rates." Or "early, the staff grows geometrically as the line grows linearly, but this relation tapers off to parallel growth." In another section of his article, Haire (1959:296-297) gave a clearer idea of the relation between company growth and the administrative ratio as he broached the concept of span of control. Here, he stated that "the ratio of supervisors to supervised does not go up as the company grows. On the contrary, as the line increased, each supervisor was responsible for more men." "The ratio of top and middle management shows an even greater decline with increasing size." And "management grows in size as the total grows, but more slowly than the total, and it is an increasingly smaller part of the whole." Apparently, Haire concluded a negative relationship between growth and the staff ratio.

Another study which included age as a factor was that of Haas, Hall, and Johnson (1963:15). In order to test the relationship between organizational age and the size of the supportive component, they computed rank order correlations and found rho = .21 with one measure of the supportive component and rho = .23 with the other. Although the correlations were positive as hypothesized, they were not considered statistically significant. Consequently, Haas, Hall, and Johnson concluded in opposition to Haire, that age appeared to be less critical than over-all size as a factor in determining the administrative ratio. Certainly, the evidence presented in either study was not conclusive. It seems that both of these longitudinal investigations would have proved more informational had they controlled for other variables such as size and complexity.

Besides Haire, Hendershot and James (1972) also included growth as a variable in their research. In the school districts they studied they found that ". . . districts whose enrollments grew slowly . . . had an average increase in the supervisor-teacher ratio. . . ." "In districts which grew more rapidly, however, the ratio decreased on the average . . ." (p. 150). This finding suggests that ". . . the effects of organization growth on the administrative-production ratio depends on the magnitude of growth. Slow growth, it appears, tends to produce an increase in the ratio, but rapid growth tends to produce a decrease" (p. 151). From their data, they suggest further that ". . . differences in recent histories of growth may confound comparisons of administrative-production ratios in organizations of different size . . ." (p. 153). For example, if in a given sample the large organizations recently had experienced rapid growth while the small organizations had been relatively stable in

size, ". . . the relationship between growth and the administrative-production ratio might give rise to a spurious negative relationship between size and the same ratio" (p. 151). Therefore, recent growth history must be controlled when looking at the relationship between organizational size and the relative size of the administrative component.

The last two variables to be examined are institutional resources and institutional quality, both of them utilized by Hawley, Boland, and Boland (1965:254). They found that "the amount of operating budget is highly correlated with both faculty size and size of administrative staff." Further,

> . . . budget size appears to have more influence on the relationship under study than that exercised by complexity. Educational quality, as represented by the per cent of faculty holding Ph.D degrees, however, exerts a negligible effect on the association. . . .

Summary

This review of the literature has provided an overview of the empirical findings to date concerning the relationships between organization size, relative size of the administrative component, and various factors of structural complexity. One major trend noted in the literature was the change from early to later research in the association observed between organization size and the relative size of the administrative component. While the early research indicated a direct relationship, later results predominantly have shown an inverse relationship. Sources for the discrepancies in findings appear to have included the operational definitions of the variables, statistical procedures employed, and the inclusion of various control variables. All of these sources have been discussed, with suggestions noted for the study at hand.

Now that the previous research efforts have been described, the theoretical framework and methodology will be presented for the present study. Theoretical considerations are discussed in the following chapter. A review of the methodology is presented in Chapter IV.

CHAPTER III

THEORETICAL FOUNDATIONS FOR THE STUDY

Theoretical Discussion

Theoretical work concerning the relationship between organizational size and the relative size of the administrative component largely has been neglected. For the most part, researchers have confined themselves to the empirical level of study. Attention has been focused on examining different types of organizations, utilizing new variables to account for more of the variance, operationalizing the variables in different ways, and implementing more sophisticated types of statistical analysis. Of course, there have been some assumptions concerning the effects of increased organizational size and the interrelationships of structural factors. And these assumptions have guided the research. But they do not constitute a formal theoretical framework. The only concerted attempt to develop a theoretical framework of interrelated propositions is found in Blau and Schoenherr (1971) and Blau (1972). As will be seen, the central concern of their work was that ". . . the analysis of differentiation in the formal structure constitutes the core of the systematic study of formal organizations" (Blau and Schoenherr, 1971:318). From the various empirical findings in their research, they sought to develop ". . . a minimum number of generalizations that through their implications can logically account for these findings concerning structural differentiation" (Blau and Schoenherr, 1971:318). The two basic propositions

designed for this purpose were: "(1) the increasing size of organizations generates structural differentiation along various dimensions at decelerating rates; and (2) structural differentiation enlarges the administrative component in organizations" (Blau and Schoenherr, 1971:318). From these two generalizations were derived nine lower-level propositions which they supported by empirical observation. The six derivations from the first generalization proposed that with increases in organizational size the marginal influence of size on differentiation declines; the average size of the organization's structural components of all kinds increases; the proportionate size of the average structural component, as opposed to its absolute size, decreases; the supervisory span of control increases; and economy of scale in management overhead is exhibited; and the economy of scale in administrative overhead declines. Deductions from the second generalization proposed that large size indirectly raises requirements for administrative personnel through the structural differentiation it generates; the direct effect of large size in promoting an economy of scale in administration exceeds the indirect effect of increasing the need for administrative personnel through the increase in structural complexity; and structural differentiation arrests the decline in the administrative ratio as size increases. Thus, a curvilinear relationship was expected to obtain.

Blau's (1972) continued effort to develop a theory of organizational structure basically concurred with the earlier work. A theoretical basis was provided from which empirical propositions could be inferred. A main supposition in this rationale was that any collective endeavor requires cooperation and social integration. Particularly because business organizations may be composed of members who do not share common values and

interests, interdependence among small heterogeneous subunits is necessary. The organization is divided into these subunits, which are each internally homogeneous according to function, in order to maximize effectiveness of operation. Differentiation, then, produces heterogeneity between, but homogeneity within, subunits. And differentiation diminishes subunit size. This process of differentiation is limited by the number of organization members available to comprise subunits. Consequently, the first theorem stated that an increase in organizational size facilitates differentiation.

As the volume of work increases and organization size increases, the size and number of subunits increase, requiring additional administrators to coordinate the work. But since investments in administration are largely independent of the increases in the amount of similar work being orgnaized (within subunits), ". . . the volume of administrative work . . . increases less than proportionately as the volume of operation increases" (Blau, 1972:23). Hence, as the volume of work and the size of the administrative component increase, the relative number of personnel needed in administration decreases. Economy of scale is the result.

Blau provided essentially the same rationale found in the earlier publication (Blau and Schoenherr, 1971) for the curvilinear relationship evident between size and the administrative ratio. If administrative investments are independent of increases in work being organized within homogeneous subunits, then the amount of administrative work is a function of heterogeneity between units. Increased size affects the administrative workload in two ways. First, it promotes a relative reduction of administrative requirements because of the homogeneity within units, which it produced through differentiation. Second, in opposition to the

first, increased size also results in increased administrative requirements because of the heterogeneity which differentiation produces between units. This stimulation of demands on administration arouses resistance which increasingly counteracts the influence of greater size in reducing the proportion of administrative personnel. Thus, the savings in administrative requirements realized by the large size of an organizational segment are more and more thwarted by the growing need for administrative manpower in the increasingly differentiated structures generated by expanding size.

One should note that the theoretical framework developed by Blau (1972) and Blau and Schoenherr (1971) was based on observations of ". . . formally established organizations with paid employees, not emergent groupings or voluntary associations of people" (Blau and Schoenherr, 1971:318). If the ultimate goal was to develop a general theory of organizations, the question may be asked whether such a theory could be constructed without research on all types of organizations. To this, Blau and Schoenherr (1971:299) responded, "It is, of course, possible to conduct research on more than one type of organization, but it is impossible to study a representative sample of all types, for there is no universe of types from which such a sample could be drawn." Besides, "there are no organizations in general, only organizations of various kinds" (Blau and Schoenherr, 1971:10). One not only can, they asserted, one must develop theory from observations of a single type of organization. In support of this conclusion, Campbell and Akers (1970:436) noted that the heterogeneity of functions and goals across the range of organizations previously studied makes it unlikely that findings could always be duplicated among different types of organizations. The development

of generalizations concerning size and structure is thereby inhibited. In order to overcome this obstacle, they stipulate that:

> . . . extraneous sources of variation can best be removed by reducing the heterogeneity of functions among organizations within the sample, not by increasing it. Research should proceed in the direction of testing relationships within more homogeneous samples of organizations (Campbell and Akers, 1970:436).

Therefore, theory which is based on one organizational type must be tested in other types before its generality can be demonstrated. Because this study examines voluntary associations, it should provide some contribution toward that end.

Conceptualization

Before conceptualizing the variables to be anlayzed in this research, the nature of voluntary associations will be distinguished from that of other types of organizations. The concepts to be discussed afterwards are patterned after the research of Campbell and Akers (1970).

Voluntary Associations

Definitions of voluntary associations seem to be quite varied, ranging in scope from broad (e.g., Sills, 1968:362-63) to narrow (e.g., Berelson and Steiner, 1964:364; Sills, 1968, 363-64; Smith and Freedman, 1972:viii). For the purpose of this research, a relatively broad definition such as the one furnished by Campbell and Akers (1970:436) seems requisite.

> The voluntary association, as a type of categoric group, is a membership organization based on similarity of interest; its function lies in the establishment, maintenance, and promotion of that which contributes to the common welfare and goals of its members.

In keeping with the typology constructed by Gordon and Babchuk (1959), this definition allows the inclusion of those organizations in which goal-directed activity is oriented both toward the behavior of non-members and toward the behavior of members. Other conceptualizations would require exceptions. While many of the former organizations would be precluded by the conceptualization of Smith and Freedman (1972), many of the latter would be objected to by Azumi and Hage (1972:8) as being mere groups, not voluntary organizations. The definition given by Campbell and Akers would seem to represent more organizations than those typologized as "mutual benefit associations" by Blau and Scott (1962:43). Included are not only those associations which are established in order to pursue intrinsic satisfaction through common activities and interests of the members (such as the Girl Scouts) and those which seek to benefit members through the pursuit of common causes (such as labor unions), but also those which may benefit outsiders--such as non-profit, voluntary service organizations. All of these organizations may be contrasted with those which most studies of size and structure have investigated--"corporate" organizations.

> Most studies of size and structure have involved either manufacturing, commercial, and other profit-making firms or "people processing," educational, governmental, or rehabilitative organizations. While there are important differences among these organizations they are all "corporate" as contrasted with "categoric" or voluntary groups. . . . The corporate organization is essentially a producing unit--its goals revolve around the production of goods, services, or processes for specified clients. It coordinates the efforts of dissimilar units, activities, and specialties of hired participants (Campbell and Akers, 1970:436).

Size and Change in Size

As structural features of the organization, size and change in size

are typically conceptualized simply in terms of the "largeness" or "smallness" of an organization. More specifically, ". . . size refers to the total number of intra-organizational participants" (Campbell and Akers, 1970:437). Change in size may generally be conceptualized as increase or decrease, growth or decline, in the size of the organization.

Administrative Component

As the review of empirical investigations indicates in Chapter II, the administrative component is defined from one study to another in a number of ways, many of which are rather ambiguous and/or heterogeneous. Some conceptual problems also are evident in this study. In general, it would seem that administrators could be identified as those who regulate and manage the affairs of the organization. Their responsibilities would include decision-making; organizing, supervising, coordinating, and controlling activities in and of the organization; regulating information flows; and planning, policy formation, policy implementation, and delegation of responsibilities. Yet, while these responsibilities would represent the preferred conceptualization of the administrative component, some constraints are placed upon its use because of the nature of the secondary data to be analyzed in this study.

Because the data source refers only to all employees (and equivalent volunteers) to whom associational members usually refer as "staff," the administrative component must be conceptualized pragmatically as ". . . all administrative, clerical, technical, professional, and kindred employees of the association" (Campbell and Akers, 1970:437). The staff of the voluntary association assists and facilitates the activities, meetings, and programs of the association and administers associational policies.

The relative size of the administrative component is conceptualized as the number of administrative as compared to other associational members.

Complexity

There is general agreement in the literature that organizational complexity is a multidimensional concept. It may be conceived as having several forms. Udy (1959:582-84), for instance, contended that complexity embodies three elements: the number of tasks performed, the maximum number of specialized operations ever performed at the same time, and the existence or non-existence of combined effort. Hall, Haas, and Johnson (1967:906), for another example, recognized complexity as a "structural condition which itself contains a number of components." They conceptualized complexity as ". . . the degree of internal segmentation--the number of separate 'parts' of the organization as reflected by the division of labor, number of hierarchical levels, and the spatial dispersion of the organization" (Hall et al., 1967:906).

The conceptualization of complexity in this study also refers to the number of separate parts of the organization. In accordance with Campbell and Akers (1970), two dimensions of structural complexity will be analyzed. The first, horizontal complexity, results from lateral differentiation of functions and refers to ". . . the extent to which there are differentiated activities and divisions at one specific level --the national office of the association (Campbell and Akers, 1970:438). The second, vertical complexity, results from hierarchical differentiation and refers to ". . . the extent to which there is differentiated 'depth' or organizational 'penetration' below the most inclusive national level" (Campbell and Akers, 1970:438).

CHAPTER IV

METHODOLOGY AND ANALYTICAL TECHNIQUES

The methodology for this study consists primarily of a multiple regression analysis of the effect of association size on the size of the administrative component, controlling for certain other structural variables. Before this procedure is explained, however, the data source and sample will first be described, followed by the operational definitions for the variables included in the study and a restatement of the hypotheses.

Data Source and Sample

Information concerning the variables to be analyzed in this study is contained in the Encyclopedia of Associations (Ruffner, 1971 and 1977). The data in this encyclopedia are compiled, arranged, and edited as a continuous project of the Gale Research Company, Detroit, Michigan. Beginning with and subsequent to the first publication of the volume in 1956, the Encyclopedia has provided description of non-profit, national voluntary associations of the United States. The 1977 edition notes that several foreign associations also are included, but only those which have considerable U.S. membership and import. The descriptions include such information as the name; location(s); founding date; number of members; objectives; name and number of committees, sections, and divisions, name and number of publications; and other data for thousands of

voluntary associations of a wide variety of types. In 1977, the Encyclopedia contained data for ". . . more than thirteen thousand trade associations, professional societies, labor unions, fraternal and patriotic organizations, and other types of groups consisting of voluntary membership" (p. vii). According to the preface of the volume, the data are kept up-to-date through a ". . . complete revision of nearly every entry . . ." (p. vii) continued from previous editions.

Only those associations were selected for study whose members were individuals, as opposed to corporations or other groups or organizations, and for which data on size and staff were available. In addition, each association must have been included in both the 1977 and 1971 editions. The list of elements in the survey population from which the sample was derived included agricultural, military, and legal associations; scientific, engineering, and technical associations; educational and cultural groups; social welfare organizations; health and medical associations; public affairs organizations; fraternal, foreign interest, nationality, and ethnic associations; religious associations; horticultural groups; veterans, hereditary, and patriotic associations; hobby and avocational groups; athletic and sports organizations; and others. These associations were described in sections two through fourteen of the Encyclopedia. Associations described in sections one and fifteen through eighteen were omitted because they included organizations which largely were not composed of individuals; or the descriptions of the organizations contained therein typically did not provide the necessary information. Section one contained trade, business, and commercial associations. Sections fifteen through eighteen contained labor unions, chambers of

commerce, Greek letter societies, and a residual category of inactive and defunct organizations.

Through simple random sampling techniques, a sample of 298 associations was drawn from the 1977 edition of the Encyclopedia.[1] For part of the analysis, the sample was post-stratified according to the cum $\sqrt{f(y)}$ rule for stratum boundaries (see Cochran, 1963:130; Kish, 1965:105), with the number of strata set at six (as suggested by Kish, 1965:102; and as used in the literature, e.g., Campbell and Akers, 1970). The resulting strata and selected characteristics for the total and stratified sample are presented in Table III.

---

[1] The appropriate sample size was determined by using the following formulas (see Kish, 1965:49-50):

$$n' = \frac{S^2}{V^2} \quad \text{and} \quad n = \frac{n}{1 + \frac{n'}{N}}$$

where: n = sample size = 268;
N = population size = 9484;
S = standard deviation of association size in the population = 290,277.311; and
V = desired variance within the sample = 17,500.

Because the parameter S of the population was not known, an estimation was made from data previously compiled from the 1961 edition of the Encyclopedia. The value of N was determined by counting all organizations listed in sections two through fourteen of the Encyclopedia. The value of V was set in order to approximate the midpoint of the widest strata interval used by Campbell and Akers (1970). By substituting the above values in the respective formulas the appropriate sample size was computed to be 268. This number was increased by 20 percent in order to adjust for those associations listed with non-individual membership or with missing data and for those not included in the 1971 edition. After 24 associations were discarded, the resulting sample size equaled 298.

TABLE III

CHARACTERISTICS OF THE SAMPLE

Stratum	n	Range of Association Size	Range of Administrative Component Size	Range of Percentage Change in Association Size	Range of Percentage Change in Administrative Component Size
1	127	10 to 1998	1 to 20	-90.18 to 400.50	-66.67 to 300.00
2	64	2069 to 5997	1 to 90	-70.01 to 358.30	-94.74 to 733.33
3	37	6286 to 15,990	1 to 75	-66.01 to 400.95	-28.57 to 750.00
4	26	16,460 to 35,078	1 to 140	-62.02 to 150.09	-33.33 to 750.00
5	21	36,982 to 79,995	1 to 500	-12.02 to 92.11	-22.58 to 160.00
6	19	99,995 to 4,233,737	5 to 4040	-6.00 to 134.02	-33.33 to 213.33
Total Sample	298	10 to 4,233,737	1 to 4040	-90.18 to 400.95	-94.74 to 750.00

Operational Definitions

Because the various operationalizations of variables used in previous research have been discussed extensively in Chapter II, the definitions supplied here will concern only those variables employed in the study at hand. As was the case with the conceptual definitions, the operational definitions of size, change in size, administrative component size, change in administrative component size, vertical complexity, change in vertical complexity, horizontal complexity, and change in horizontal complexity follow from the definitions created by Campbell and Akers (1970).

Organization Size

Because "it is the participants who join who give a voluntary association its definition, thereby making formal membership the appropriate measure of size" (Campbell and Akers, 1970:437), the size of an association in this study was measured by the total number of persons holding regular membership reported in the association. The number of paid staff was subtracted from the total in order that the variables organization size and size of the administrative component not be definitionally dependent.

Change in Organization Size

Change in organization size was operationalized simply as the numerical difference in size from 1971 to 1977.

Administrative Component Size

The size of the administrative component was operationalized as the number of paid staff reported in the association.

Change in Administrative Component Size

Change in the size of the administrative component was operationally defined as the numerical difference in paid staff from 1971 to 1977.

Horizontal Complexity

Similar to Campbell and Akers (1970:438), horizontal structural complexity was measured by two indexes: (1) Committees--the total number of councils, committees, divisions, sections, and/or formally designated interest groups at the national level of the association; (2) Publications--the total number of different publications issued by the national association. Unlike Campbell and Akers (1970), the latter index included such publications as books and research monographs, in addition to periodical publications. The first measure was considered valid because it represented the result of same-level horizontal differentiation. The second measure was not so obvious. Yet, ". . . insofar as the organization which sponsors and publishes some periodical organ is engaging in at least one more activity at the national level than the one which does not, there is some justification in using this index" (Campbell and Akers, 1970:439).

Change in Horizontal Complexity

This variable was measured as the numerical difference in Committees or as the numerical difference in Publications from 1971 to 1977.

Vertical Complexity

Vertical structural complexity also was operationalized in two ways: (1) Levels--the combined number of levels in the hierarchy of the association, ranging from one to four: national only, national and regional or state, and national and regional and/or state and local. Contrary to most other operationalizations of vertical complexity, this index did not measure hierarchical differentiation of the authority structure. Rather, in the manner of Campbell and Akers (1970),the index reflects "penetration" of the association below the national level. "An organization that included three or four different levels (national, regional, state, and local) is more vertically differentiated than one which has no additional levels below the national" (Campbell and Akers, 1970:439). (2) Subunits --the total number of subunits reported in an association. This measure was designed to discriminate between associations which have the same number of hierarchical levels but are differentiated variously within these levels. At first glance, this index would seem to be no more than another measure of horizontal complexity. However, because the number of subunits per level were summed over all levels, the operationalization seemed to be a valid indicator of vertical complexity:

> An organization which theoretically has ties down to the county or even municipal level but really has only state societies in half the states and organizations in only a handful of counties within those states should be considered actually less vertically complex than the association which has several regional divisions, associations in every state, and all or most counties organized within those states (Campbell and Akers, 1970: 439).

Change in Vertical Complexity

Change in vertical structural complexity is indicated in the same

manner as change in horizontal structural complexity, that is, as the numerical difference in Levels or as the numerical difference in Subunits from 1971 to 1977.

Statement of Hypotheses

The operationalized variables may now be related in a set of testable hypotheses. For the most part, these hypotheses consist of a restatement of the propositions stated in Chapter I. The only difference is the inclusion of the indicators of vertical and horizontal complexity and changes therein. The first five hypotheses pertain to the cross-sectional analysis; the second five hypotheses pertain to the longitudinal analysis.

Hypothesis One: The larger the organization, the smaller will be the relative size of the administrative component.

Hypothesis Two: Introduction of number of levels as a control variable will increase the amount of variance explained in the relationship between organization size and the relative size of the administrative component.

Hypothesis Three: Introduction of number of subunits as a control variable will increase the amount of variance explained in the relationship between organization size the relative size of the administrative component.

Hypothesis Four: Introduction of number of committees as a control variable will increase the amount of variance explained in the relationship between organization size and the relative size of the administrative component.

Hypothesis Five: Introduction of number of publications as a control variable will increase the amount of variance explained in the relationship between organization size and the relative size of the administrative component.

Hypothesis Six: As change in organization size increases, the relative change in the size of the administrative component decreases.

Hypothesis Seven: Introduction of change in number of levels as a control variable will increase the amount of variance explained in the relationship between change in organization size and relative change in the size of the administrative component.

Hypothesis Eight: Introduction of change in number of subunits as a control variable will increase the amount of variance in the relationship between change in organization size and relative change in the size of the administrative component.

Hypothesis Nine: Introduction of change in number of committees as a control variable will increase the amount of variance explained in the relationship between change in organization size and relative change in the size of the administrative component.

Hypothesis Ten: Introduction of change in number of publications as a control variable will increase the amount of variance explained in the relationship between change in organization size and relative change in the size of the administrative component.

Method of Analysis

The statistical methods used to analyze the data are simple and multiple linear regression. In the case of the cross-sectional data, size of the administrative component was regressed on size of the organization in order to establish the nature of the primary relationship. Then, each of the variables pertaining to structural complexity was introduced in turn as third factors in a multiple regression model in order to determine what effects structural complexity may have on the primary relationship. Analyses of the longitudinal data proceeded in the same order.

The traditional approach in examining the relationship between organization size and the administrative component has been to correlate the former with a ratio measure of the relative size of the latter. This procedure has been criticized on the grounds of definitional dependency (Akers and Campbell, 1970; Freeman and Kronenfeld, 1973). The problem essentially is that size typically is operationalized as the number of

members in the organization, or some portion thereof. In this case the variable may involve the regular members plus the administrative staff, or M + A. The relative size of the administrative component, then, is the ratio of administrative staff to the size of the organization, or A / M + A. Because the components of the variables are the same, they are definitionally dependent. Therefore, according to Freeman and Kronenfeld (1973), one may expect a correlation between the two variables just by definition. They demonstrate this mathematically and by showing that a set of random data will produce a scattergram very similar to those reported in the literature which show an inverse correlation between the variables. Akers and Campbell (1970:245) state the problem somewhat more simply when they indicate that relating the two variables could lead to a spurious negative relationship since as size increases, it produces an ever larger denominator which would tend automatically to decrease the value of the administrative ratio. One should note that the magnitude of the error thereby created would not necessarily be large, however; since the administrative ratio has as its numerator a value which is definitionally independent of organization size, the relationship is not completely circular. But, they conclude, ". . . the problem is serious enough to warrant using some alternative method to help validate findings when the ratio measure is used" (Akers and Campbell, 1970:245).

Whatever the merit of the argument, at least one alternative methodology can be employed to overcome this criticism and still address the central issue regarding the relationship between organizational size and the administrative ratio: Does the size of the administrative component increase proportionately or disproportionately with increase in

organizational size? The method simply is to regress absolute size of the administrative component, A, on organization size, M, not including the size of the administrative component. By observing the form of the relationship, one can determine whether it is proportional. If it is not, the degree of disproportionality can be estimated by the regression coefficient.

If A is regressed on M and the A-intercept is not significantly different from zero, a proportionate relationship exists between A and M. If A is regressed on M and the A-intercept is other than zero, a disproportionate relationship exists between A and M. When it is less than zero, A increases disproportionately rapidly relative to M. If, on the other hand, the A-intercept is greater than zero, A increases disproportionately slowly. In this latter case, "economies of scale," as discussed by Blau and Schoenherr (1970) may be said to exist. The difference of the A-intercept from zero can be tested for significance. Notice that the value of the regression is irrelevant: whether the relationship is proportional is distinct from the extent of the proportionality (see Freeman and Kronenfeld, 1973:118-19).

One should note that other than the illustration of the regression procedure presented by Freeman and Kronenfeld (1973), this method has not been carried out successfully in any study currently available in the literature. Akers and Campbell (1970) employ the regression technique; but they regress the total size of the organization, M + A, on the size of the administrative component, A. Thus, they fail to avoid definitional dependency. Consequently, the findings of this study may not be directly comparable to the previous research.

To date, the regression procedure has not been extended to an analysis of longitudinal data concerning changes in organization structure. This study constitutes the first attempt to perform such an analysis. The technique will be the same as that for the cross-sectional data. The only difference is that change in the size of administrative component is regressed on change in size of the organization. The relative change in the administrative component may then be inferred from an inspection of intercepts and slopes provided by the regression analysis.

CHAPTER V

HYPOTHESES EVALUATION AND ANALYSIS

Introduction

The findings of this research will be presented in the order suggested in the previous chapter. First, the analytical results will be examined which pertain to the cross-sectional hypotheses. The major question to be addressed concerns the nature of the relationship between organization size and the relative size of the administrative component. Once this primary relationship has been established, the third variable effects of structural complexity will be examined.

While the cross-sectional analysis focuses attention on the relative sizes of administrative components across different size organizations, at one point in time, the longitudinal analysis is designed to investigate what relative changes take place in the size of the administrative component as changes in organization size occur within the same organization. After the primary relationship has been examined between change in organization size and relative change in the size of the administrative component, the variables pertaining to changes in structural complexity will be inserted to see what effect they have as third factors.

One should note that the techniques used and the findings generated thereby are applicable only to the survey population, i.e., the 9484 associations listed in sections two through fourteen in the 1977 edition

of the Encyclopedia of Associations. The extent to which this population is representative of the general population of similar voluntary associations cannot be established. Any inference made from the sample at hand to this general population can only be speculative.

Evaluation of Hypothesis One

Hypothesis One concerns the primary relationship between organization size and the relative size of the administrative component. In order to answer the question of whether the relationship between the two variables is proportional or disproportional, a simple linear regression of administrative component size on organization size was performed. The resulting intercepts, slopes, and r^2 coefficients are presented in Table III.

Of immediate interest is the observation that across the total sample knowledge of organization size explains almost 95 percent of the variance in the size of the administrative component. This not only means that variation in the size of the administrative component is closely associated with variation in the size of the organization, but also that the simple, "straight arithmetic," linear regression model is appropriate because of the fit of the line of least squares.

The more important interpretation of the data concerns an explanation of the relative size of the administrative component. This interpretation rests upon an inspection of the intercept (a) reported in column one and the slope (b) reported in column two. The coefficient is positive for the slope of the line of least squares across the total sample. This positive direction means that the absolute size of the administrative component increases as the size of the organization

increases. Others who have obtained similar results include Campbell and Akers (1970), Akers and Campbell (1970), and Hawley (1965). The numerical value of the regression coefficient for the slope indicates that as size of the organization increases by 1000 members, the absolute size of the administrative component at the national level increases by about one staff employee.

The A-intercept for the total sample is not statistically different from zero. This finding suggests that the relationship between organization size and absolute size of the administrative component is proportional. The regression equation, then, may be written as

$$A = 0 + .001M + e$$

Given this formula, the increase to be expected in A (number of administrators) with an increase of, for example, from 1000 to 3000 in M (number of members) would be from one to three. In other words, if M increases by three times, the expected value of A increases by three times--a directly proportional increment. This discovery of a directly proportional relationship is contradictory to the theoretical expectation of "economies of scale" and is not consistent with Hypothesis One.

In order to ascertain whether this proportional rate of increase obtains over the full range of association sizes, the associations were divided according to the cum $\sqrt{f(y)}$ rule into six strata along the association size continuum (Akers and Campbell, 1970, first suggested this procedure). Simple linear regression analysis was then performed on the associations within each of the strata. The results are shown in Table IV.

Among a number of findings which should be noted, reading the table across the values for each stratum, is the statistically significant

TABLE IV

INTERCEPTS (a), SLOPES (b), AND AMOUNT OF VARIANCE EXPLAINED (r^2) BY LINEAR REGRESSION OF ADMINISTRATIVE COMPONENT SIZE ON ORGANIZATION SIZE FOR TOTAL SAMPLE AND FOR SIX SIZE CATEGORIES

Size Categories	a Column 1	b Column 2	R^2 Column 3
Total (n = 298)	-1.88*	.000975[1]	.9470
10-1998 (n = 127)	3.21[1]	-0.000240*	.0015
2069-5997 (n = 64)	13.29[2]	-0.000104*	.0080
6286-15,990 (n = 37)	5.72*	.000910*	.0250
16,460-35,078 (n = 26)	14.79*	.000580*	.0090
36,982-79,995 (n = 21)	175.88*	-0.001980*	.0420
99,995-4,233,737 (n = 19)	-125.44*	.001030[1]	.9600

*Not significantly different from zero.

[1] $p > |T| = .0001$.

[2] $p > |T| = .0246$.

difference from zero of the A-intercept for the smallest associations (10-1998). If the intercept is not zero and is positive, the indication is that the number of staff employees increases disproportionately slow relative to increases in numbers of members. Yet, the negative regression coefficient for the slope would indicate that the number of staff employees decreases with increases in number of members. While this set of coefficients would appear contradictory as well as contrary to expectations, one should observe that the slope is not significantly different from zero and that the linear regression of A on M accounts for only fifteen-hundredths of a percent of the variance in the dependent variable. With this size category, then, knowledge of association size simply does not facilitate prediction of the size of the administrative component.

While similar results are evident for associations ranging from 2069 to 5997 in size, a slight difference may be observed in the strata comprised of associations ranging in size from 6286 to 79,995. In each of these strata, the intercepts are not significantly different from zero. This would mean that increments in administrative component size are proportional to increments in association size, except that once again, whether positive or negative, the slopes are not significantly different from zero and the amount of variance explained is negligible.

Only among the largest associations (99,995 to 4,233,737) are absolute size of the administrative component and size of the association significantly related. Because the results for this stratum are very nearly identical to those for the total sample, the coefficients for the total sample are a function of the extreme cases among the largest associations. This finding is concurrent with that of Akers and Campbell (1970).

In summary, Hypothesis One is not supported. In the total sample and in the stratum of largest associations a significant relationship is discovered between the size of the administrative component and size of the organization. But the relationship is proportional, not disproportional as predicted. Among the other strata, no significant relationship is found between the variables. In these strata, some other factor or factors must be examined if variation in administrative component size is to be explained.

Evaluation of Hypotheses Two Through Five

Hypotheses Two through Five were designed to test the effects of structural complexity on the primary relationship between administrative component size and association size. An inspection of Table V shows that in all cases, both among the total sample and among each of the six strata, the four hypotheses are supported. Introduction of the complexity factors does increase the amount of variance explained. But while the magnitude of r^2 is enhanced in every case, the actual increase in the amount of variance explained is practically nil in all but two instances. Of course, this would be expected across the total sample and in the stratum of largest associations because the coefficient (r^2) for the primary relationship shows that 95 percent of the variance is already explained.

When number of committees and number of publications are introduced as third variables, respectively, in the regression equation for associations 10-1998 in size, the amount of variance explained in administrative component size increases from about fifteen-hundredths of 1 percent to about 12 percent in the case of the former and about 11 percent in the

TABLE V

AMOUNT OF VARIANCE EXPLAINED (r^2) BY LINEAR REGRESSION OF ADMINISTRATIVE COMPONENT SIZE ON ORGANIZATION SIZE AND BY LINEAR REGRESSION OF ADMINISTRATIVE COMPONENT SIZE ON ORGANIZATION SIZE WITH EACH COMPLEXITY VARIABLE INTRODUCED AS A THIRD VARIABLE, FOR TOTAL SAMPLE AND FOR SIX SIZE CATEGORIES

Size Categories	Organization Size	Levels	Subunits	Committees	Publications
Total (n = 298)	.946930	.947747	.956963	.946958	.946957
10-1998 (n = 127)	.001496	.012645	.011736	.121402	.113830
2069-5997 (n = 64)	.008515	.037211	.015009	.008643	.049354
6286-15,990 (n = 37)	.025095	.083845	.025388	.079204	.036873
16,460-35,078 (n = 26)	.009205	.016050	.084629	.016045	.023132
36,982-79,995 (n = 21)	.041779	.073147	.049416	.042423	.085913
99,995-4,233,737 (n = 19)	.959664	.962999	.962638	.959910	.961630

case of the latter. The correlation coefficients showing the extent of association between predicted and observed values of administrative component size would be .35 and .34, respectively.

One conclusion from this set of findings would be that while the hypotheses are all supported, the extent of the support is neither statistically significant nor substantial, with two exceptions. In these two cases, number of committees and number of publications not only enhance the relationship between administrative component size but also are found to be substantially better predictors of the dependent variable than is association size. In all other cases, knowledge of structural complexity affords no appreciable addition to knowledge of the relative size of the administrative component.

Evaluation of Hypothesis Six

The analyses of the relationship between change in organization size and change in the relative size of the administrative component are presented in Table VI. This relationship is perhaps of the greatest theoretical interest of all those tested in this study. Only in this relationship is some idea gained concerning what happens to the relative size of the administrative component within an organization as that organization changes over time. In order to test this relationship, the actual change in administrative component size was regressed on the actual change in organization size, with changes in both variables taking place from 1971 to 1977. An interpretation of whether change in administrative component size is proportional or disproportional to change in organization size may then be made from observation of the A-intercept. The amount of change may be inferred from the slope of the line of least squares.

TABLE VI

INTERCEPTS (a), SLOPES (b), AND AMOUNT OF VARIANCE EXPLAINED (r^2) BY LINEAR REGRESSION OF CHANGE IN ADMINISTRATIVE COMPONENT SIZE ON CHANGE IN ORGANIZATION SIZE FOR TOTAL SAMPLE AND FOR SIX SIZE CATEGORIES

Size Categories	a Column 1	b Column 2	R^2 Column 3
Total (n = 298)	2.11*	.00056[1]	.380
10-1998 (n = 127)	0.17*	.00021*	.004
2069-5997 (n = 64)	0.92*	.00028*	.010
6286-15,990 (n = 37)	2.65*	.00042[2]	.130
16,460-35,078 (n = 26)	5.83*	.00112[3]	.230
36,982-79,995 (n = 21)	8.75*	-0.00027*	.030
99,995-4,233,737 (n = 19)	14.24*	.00052[4]	.280

*Not significantly different from zero.

[1] $p > |T| = .0001$.

[2] $p > |T| = .0242$.

[3] $p > |T| = .0098$.

[4] $p > |T| = .0197$.

Because the A-intercept reported in column one is not significantly different from zero, change in administrative component size may be interpreted as proportional to change in organization size. The regression coefficient for the slope is positive, which indicates that change in the size of the administrative component increases as change in organization size increases. The numerical value of the coefficient suggests that as organizations increase their membership by 2000 persons, their administrative components at the national level increase by about one person. The regression equation, then, may be written as

$$A = 0 + .00056M + e$$

Given this formula, the increase to be expected in A (change in number of administrators) with an increase of, for example, from 2000 to 4000 in organization size (which means M, change in organization size, equals 2000) would be about one. Thus, every time the organization changes by two times its size, the expected value of A increases by two times its size--a directly proportional increment. Again, as with the cross-sectional data, the discovery of a proportional rate of change is contradictory to theoretical expectations. On the basis of these coefficients, Hypothesis Six must be rejected.

In order to test whether the relationship holds across different size organizations, regression analyses were performed in each of the six strata of association size. The resulting coefficients again are presented in Table VI. A summary glance over the table shows that the relationship for the total sample does not obtain for all different size categories within the total sample. Change in administrative component size and change in organization size are not significantly or substantially related in associations ranging in size from 10-1998, 2069-5997,

and 36,982-79,995. Any interpretation of intercepts and slopes would be useless in these strata. In the strata of associations ranging in size from 6286-15,990, 16,460-35,078, and 99,995-4,233,377, however, statistically significant relationships are obtained, with the amount of explained variance ranging from 13 percent to 28 percent. The slope for the first of these strata is positive, which means that changes in administrative component size increase as changes in organization size increase. The numerical value of the coefficient indicates that as change in size of the organization increases by 10,000 members, change in the size of the administrative component increases by about 4 members, a rate slightly lower than that for the total sample. Because the intercept is essentially zero, this coefficient means that changes in the size of the administrative component occur at a rate which is proportionate to changes in the size of the organization. In this particular case, the regression equation may be written as

$$A = 0 + .0004M + e$$

A similar equation is found for organizations 16,460-35,078 in size. An exception may be observed in the different coefficient for the slope. Instead of a rate of change of four per 10,000 members, the slope in this stratum indicates a change of eleven administrators for every change of 10,000 members, or a change of about one administrator for every change of 1000 members. The regression equation would be

$$A = 0 + .0011M + e$$

When this equation is compared to the preceding one, it shows a difference in relative change in number of administrators of about seven. Apparently, there is some factor present in this size category which

requires a relatively larger number of administrators, even though the rate of change in administrators is proportionate to the rate of change in number of members within the stratum.

The coefficients for the stratum of largest associations are similar to those for the total sample. The slope again is positive, indicating an increase in change of the size of the administrative component for an increase in change of the size of the organization. Because the intercept is not significantly different from zero, the relationship is proportional. Given the numerical value of the slope, an increase of 10,000 members would be associated with an increase of five administrators. The regression equation is

$$A = 0 + .0005M + e$$

In summary, the relationship obtained for the total sample is not found across the whole range of association sizes. While significant relationships between the variables are obtained in three of the strata, they are not obtained in the other three. Among those strata which have significant regressions and interpretable results, only that containing the largest associations has coefficients which approximate the coefficients for the total sample. The other two also have zero intercepts, therefore proportionate relationships, and positive slopes. But the increment expected in change in the size of the administrative component is much greater in the one than in the other. Neither of the slopes is the same as that for the total sample.

There is some trend for the relationship between change in administrative component size and change in organization size to hold among the larger size associations. However, in the stratum of associations ranging in size from 36,982-79,995 there is no significant relationship

between the variables. Within this stratum and within the strata of smaller size associations, other factors must be involved in the determination of change in administrative component size.

Evaluation of Hypotheses Seven Through Ten

Hypotheses Seven through Ten predict that change in vertical and horizontal structural complexity will increase the amount of variance explained in the primary relationship when introduced as control variables. An inspection of Table VII shows support for these hypotheses in every case, both in the total sample and in each of the six strata. For the most part, increments in explained variance are not appreciable. But in three instances, the gain in variance explained appears to be quite substantial. In the strata of associations ranging in size from 36,982-79,995, where no statistically significant relationship was found in the primary variables, addition of change in number of levels and change in number of publications as third variables, respectively, in the regression model produce r^2 coefficients of almost .8 and .51. Because there is no significant change in the slope for change in organization size, the real predictors of change in administrative component size seem to be the two complexity variables.

TABLE VII

AMOUNT OF VARIANCE EXPLAINED (r^2) BY LINEAR REGRESSION OF CHANGE IN ADMINISTRATIVE COMPONENT SIZE ON CHANGE IN ORGANIZATION SIZE AND BY LINEAR REGRESSION OF CHANGE IN ADMINISTRATIVE COMPONENT SIZE ON CHANGE IN ORGANIZATION SIZE WITH CHANGE IN EACH COMPLEXITY VARIABLE INTRODUCED AS A THIRD VARIABLE, FOR TOTAL SAMPLE AND FOR SIX SIZE CATEGORIES

Size Categories	Change in Organization Size	Change in Levels	Change in Subunits	Change in Committees	Change in Publications
Total (n = 298)	.382642	.382643	.406348	.382733	.385429
10-1998 (n = 127)	.004298	.004301	.004498	.004511	.005436
2069-5997 (n = 64)	.011232	.011472	.011355	.015196	.011237
6286-15,990 (n = 37)	.129876	.136747	.129926	.152821	.143241
16,460-35,078 (n = 26)	.230264	.236306	.242600	.245510	.234778
36,982-79,995 (n = 21)	.028762	.795625	.029636	.065284	.506708
99,995-4,233,737 (n = 19)	.280637	.281260	.313054	.284173	.409269

CHAPTER VI

SUMMARY AND CONCLUSIONS

Perhaps one major conclusion which can be made from this research is that organization size and changes therein are not the primary determinants of organizational structure as posited by those who assume the structuralist perspective, at least not with regard to the sample at hand and the manner in which the variables have been conceptualized. Analysis of the cross-sectional data for the total sample showed that although knowledge of variation in organization size explained 95 percent of the variation in size of the administrative component, these effects were produced solely by the inclusion of extremely large associations in the sample. When the sample was stratified in order to see what relationships obtained within various categories of organization size, no statistically significant or substantial correlations were established except among the largest associations. This finding suggests that the variables are related in some significant manner only after a certain point of relative origin is reached along the range of organization sizes. Indications from the current analyses are that this point is reached among voluntary associations somewhere between 80,000 and 100,000 in membership size. After that point, the administrative component appears to increase proportionally with organization size by a ratio of one per one thousand.

A comparison of these findings with those of Akers and Campbell

(1970) indicates several similarities. Those researchers also found that a "straight arithmetic line" provided the best fit, but not as much variance was explained in the primary relationship as in this research (r^2 = .69 and r^2 = .95, respectively). Considering that their sample was supposedly more homogeneous, because it was comprised solely of occupational associations while the sample in this study was composed of a variety of associations, the difference in the amount of variance explained is unexpected. Even so, Aker's and Campbell's analysis revealed a very similar regression coefficient to the one found here (b = .0012 and b = .000975, respectively). In addition, their results within categories of association size were similar to the findings of this investigation, in that the relationship between administrative size and association size held only for the large associations (in their case, 50,000+ members).

Analyses of the longitudinal data also indicated that organization size may not be always the primary structural determinant. Herein, change in organization size accounted for 38 percent of the variance in change in the size of the administrative component, across the total sample. But when the sample was stratified, no statistically significant relationships were found in three of the strata. In the other three strata, the amount of variance explained ranged from 13 to 28 percent. Thus, the major amount of variance remains to be explained, even in those strata where significant relationships occurred between the two variables.

Because much of the variance in administrative component size and changes therein remained unaccounted for by knowledge of organization size, variables pertaining to structural complexity were introduced to see what effect they may have on the primary relationship. In all cases,

the amount of variance explained was increased as predicted. But in the cross-sectional analysis, the increase in variance explained was significant only with respect to horizontal complexity (number of committees and number of publications) among the associations ranging in size from 10 to 1998 members. In the longitudinal analysis, the increment in explained variance was significant only in the case of change in levels and change in publications among those associations ranging in size from 36,982 to 79,995 and in the case of change in publications among the very largest associations. In all these cases except the latter one, structural complexity along the dimensions cited was a much better predictor of the size of the administrative component or changes in the size of the administrative component than was organization size or changes therein. But for the most part, structural complexity variables and variables dealing with changes in structural complexity were not rival explanatory variables.

Another major finding in this research concerns the interrelations predicted between the primary variables by the formal structural theory proposed by Blau (1972) and Blau and Schoenherr (1971). Contrary to the theoretical expectations of a disproportionately slow increment in administrative component size for increments in organization size, the data analyzed in this study indicated, when significant relationships were obtained, that the administrative component increases proportionally with increases in organization size. Apparently for national voluntary associations of the sort analyzed in this research, current structural theory is inadequate (at least for the manner in which the variables were operationalized).

A comparison of the findings between the cross-sectional and longi-

tudinal analyses affords some interesting observations. For one, the relationships obtained between the primary variables in both cases across the total sample were apparently produced by the relationships evident between these variables in the stratum of extremely large associations. This finding may indicate that the formal theory of organizational structure, which was developed from analysis of corporate organizations, applies best to the largest voluntary associations. These organizations may be expected to more closely approximate the bureaucratic requirements of the corporate organizations than would be the case of smaller voluntary associations.

Another comparison between the cross-sectional and logitudinal data concerns the difference in the respective rates of increase obtained for the size of the administrative component. In the cross-sectional analysis, the administrative component was found to increase by 10 for each increase of 10,000 members, both in the total sample and in the stratum of largest associations. But in the longitudinal analysis, the rate of increase found across the total sample and in the stratum of largest associations was 5 per 10,000. Apparently changes in size within an organization across points in time do not place the same requirements on the administrative component as would be expected from looking across different size organizations at one point in time. Because the theoretical question is really concerned with the longitudinal case, analysis of cross-sectional data would provide misleading conclusions which may have important implications for policy-making and implementation.

In both the cross-sectional and longitudinal analysis, inclusion of variables pertaining to structural complexity appear, for the most part, to have little effect on the relationship between size of the organiza-

tion and size of the administrative component. But while they afford no sweeping conclusions, other than perhaps their usual lack of utility, the indication that certain knowledge of these variables enhances explanation and prediction within certain categories of association size but not in others suggests, if nothing else, that size is not just a quantitative but is also a qualitative variable. Other indications are available. One is the strong relationship exhibited between size and the administrative component among the very large associations while there is a lack of relationship in other size categories. The fluctuations in magnitude of the slope coefficients from one stratum to another indicates that certain size categories have different relative sizes of administrative components. Because organization size has not been dealt with as a qualitative variable in either cross-sectional or longitudinal research the suggestion that the variable does have qualitative differences may have interesting implications for future research. These implications will be considered after a discussion of some of the limitations of the present study.

Limitations and Suggestions For Future Research

The limitations of the research performed for this investigation generally can be subsumed under three sources: biases in obtaining adequate subject matter, biases which affect the search for causal relationships, and the effects of economics. Regarding the first of these sources of limitations, the data used in the analyses are perhaps the major restriction on the research. Related errors may be traced to sampling biases, insufficient subject matter, and problems in the nature

of knowledge, all of which result in part from the indeterminable accuracy of the secondary source from which the data are compiled. The reliability and validity of the information reported in the Encyclopedia of Associations cannot be determined therein. In addition, the amount of information reported for each association restricts the number of associations which can be analyzed, the extent of analysis, the number of variables to be examined, and the ways in which these variables can be operationalized.

Still another limitation of the data concerns the nature of knowledge in sociological research. The point of contention here is whether the external quantitative methodology afforded by the type of data at hand is adequate to answer the questions of theoretical interest. Perhaps an internal, qualitative approach would be helpful in delineating the nature of the relationships between structural variables. Presumably, what happens in an organization is dependent upon the social actions and social interactions of individuals who comprise the organization. Internal social processes which would be of importance in determining the relative size of the administrative component include decision-making, personnel practices, personal influence, and communication patterns, among others.

Aside from limitations regarding inadequate subject matter, there are certain problems in the research which may be related to attempts to establish causal relationships between the variables. One of these problems has to do with the possibility of interaction effects, or feedback. Another concerns the nature of longitudinal data as related to the questions of theoretical interest. Regarding the first of these problems, one should observe that in using the regression procedure, the

examination of the effects of the organization's membership on the administrative component ignores the effects of the administrative component on itself. The reformulation in the regression procedure of the theoretical problem leaves this question out of the original hypothesis tested by the ratio procedure (cf. Freeman and Kronenfeld, 1973:118). If increases in total organization size are thought to lead to increases in the relative size of the administrative component, then increases in regular membership alone cannot be presumed to affect changes in the administrative component. Increases in the administrative component also produce problems of complexity and coordination which would require more administrators. In short, the problem is one that is shared by much of sociological research: should a recursive or nonrecursive model be assumed? If a recursive model is justified, the ratio procedure, not the regression procedure employed here, allows for feedback effects. Even so, the correlation analysis does not provide any means by which these effects may be sorted out.

A similar problem is evident if one questions whether cross-sectional data taken from different points in time, as is the case with respect to the longitudinal analysis presented in this report, satisfy the need for longitudinal, time-series analysis which attempts to follow changes in each organization between points in time. Again, interaction effects are problematic and might better be investigated through more sophisticated statistical techniques and/or methodological procedures which do not entail the assumption, as does regression analysis, that all the effects take place simultaneously. Even improved statistical methods do not offset the apparent need for data of the historical and biographical sort with respect to each organization to be analyzed.

One question which this sort of data might better address is whether an increase in organization size precedes increases in structural complexity, which in turn precedes increases in the size of the administrative component. There is no empirical data showing that the opposite chain of events does not occur. Jane Jacobs (1970) argues forcefully that the size of cities depends on the prior expansion in the division of labor. Such expansion ultimately depends on administrative decision. Thus the order of variables is exactly the opposite of that proposed in the structural theory of organizations.

A concluding comment about limitations concerns the effects of the economic factor in research. In the present study, this factor places a considerable restriction on such aspects of the investigation as the procedure used to produce the data, the size of the sample, the number of variables to be investigated, the ways in which variables can be operationalized, the extent and type of analysis, and the amount of bias which has to be tolerated versus the cost of adequate controls. If a sample as large as 298 voluntary associations was to be investigated, cost restrictions required the use of available secondary sources as opposed to other methods of data collection. In turn, the use of secondary sources limits the number and kinds of variables which can be analyzed.

Practically all the information supplied in the Encyclopedia of Associations has been exhausted for each association in the sample. To include more variables, or to operationalize the ones which were used in a different manner, would involve a considerable amount of expense. One would have to go beyond the present effort in order to obtain information directly from those organizations being investigated.

While the immediately preceding paragraphs have outlined limitations

of the present research effort, the following paragraphs conclude the report with a number of suggestions for future investigations. For the most part, these suggestions are parallel to the discussion of limitations because they are conceived in order to avoid or overcome those problems which have been realized in the research. Of the proposals to be made, perhaps the most salient is the one derived from the need to surmount the constraints of secondary source data. Particularly, the researcher should become better acquainted with the nature of the voluntary associations under study through primary investigation. The reasons for such study are varied: the reliability and validity of the secondary source data need to be established; additional information is needed for many associations in order that more of the associations can be included in the analysis; conceptual and operational definitions of variables may be refined; and additional variables may be incorporated in the research.

Other possibilities for future research would involve additional use of the regression procedure. This procedure has been used only in a limited fashion but could be fruitful in supplementary or extended applications, particularly with longitudinal data. The form of the relationship between organization size and administrative component size, and changes in both, could be checked across various organizations other than voluntary associations. Do the slopes of the lines of least squares vary across different types of organizations? Does the amount of explained variance differ from one type of organization to another? Perhaps in some size categories or in some types of organizations, other types of regression models than simple linear ones would be more appropriate.

Alternative statistical procedures should be considered also. One

suggestion in this regard is the use of path analysis. Meyer (1972), for example, suggests the merits of such analysis in looking at the influence of size on the structure of the organization, particularly with the use of longitudinal data.

The need for continued examination of longitudinal data is obvious. However, if any causal sequences are to be established, it would seem necessary not merely to analyze various indicators of structural changes at different points in time, and not merely to test the effects of rates of change in one variable upon changes in another, but to take advantage of historical and biographical data available from the organization's inception.

A final suggestion is derived from the indications in Chapter V that size is a qualitative, not just a quantitative, variable. If this is the case, the delineation of possible qualitative differences among different size associations may lead to explanations of variation in the administrative component in those associations.

For example, the very large associations noted in the regression procedure may contain national staff components more nearly typical of the usual theoretic bureaucracy than would be found in small associations. These administrative components may be relatively more autonomous and rational in their decision-making and may have greater power in implementing organization activities and changes. The factors of autonomy, rationality, and power, rather than goals, may be decisive in effecting structural characteristics; for if two organizations appear to have similar goals, the means by which these goals are decided and implemented would appear to differentiate between the two organization's structures. That these factors are postulated to influence organization structure

may be seen clearly in various sources. Blau and Scott (1962), for example, discuss the possibility of a trend toward oligarchy among "mutual-benefit" associations. After an association reaches a certain age and size, there may evolve a relatively autonomous elite who control the organization's objectives. Finally, Eisenstadt (1959) states that the structural characteristics of a bureaucratic organization are dependent upon the type of equilibrium that the organization develops in relation to its environment. Goals of the organization are of interest in this equilibrium because they provide the link between the organization and the society in which it is located. But the important factors to be considered are the extent to which the organization controls certain parts of its environment (such as the spheres of life of its personnel), or power; the extent to which the organization is directly dependent on its clientele, or autonomy; and the efficiency, or rationality, of the organization in meeting its goals. The works of Etzioni should be instructive with regard to examining efficiency as a variable.

The preceding suggestions obviously do not include all the possibilities for research into the questions of interest in this thesis. However, some of the implications would seem to merit consideration. Whether the suggestions given are utilized, further research into the nature of complex organizations is mandatory. One can hardly overlook the prolific nature of such organizations. A large part of human behavior occurs within their milieu. If this behavior is to be understood, there must be some knowledge of the organizational context within which it takes place.

BIBLIOGRAPHY

Akers, Ronald L. and Frederick Campbell
1970 "Size and the administrative component in occupational associations." Pacific Sociological Review 13:241-51.

Anderson, Theodore R. and Seymour Warkov
1961 "Organizational size and functional complexity: a study of administration in hospitals." American Sociological Review 26:23-28.

Azumi, Koya and Jerald Hage
1972 Organizational Systems: A Text-Reader in the Sociology of Organizations. Lexington, Massachusetts: D.C. Heath.

Bendix, Reinhard
1956 Work and Authority in Industry. New York: Wiley.

Berelson, Bernard and Gary A. Steiner
1964 Human Behavior: An Inventory of Scientific Findings. New York: Harcourt, Brace, and World.

Bierstedt, Robert
1948 "The limitations of anthropological methods in sociology." American Journal of Sociology 54:22-30.

Blau, Peter M.
1956 Bureaucracy in Modern Society. New York: Random House.
1972 "Interdependence and hierarchy in organizations." Social Science Research 1:1-24.

Blau, Peter M. and Richard M. Scott
1962 Formal Organizations. San Francisco: Chandler Publishing Company.

Blau, Peter M. and Richard A. Schoenherr
1971 The Structure of Organizations. New York: Basic Books.

Campbell, Frederick and Ronald Akers
1970 "Organizational size, complexity, and the administrative component in occupational associations." Sociological Quarterly 2:435-51.

Caplow, Theodore
1957 "Organizational size." Administrative Science Quarterly 1:502.

Comte, Auguste
1853 The Positive Philosophy of Auguste Comte. Volume 2. Tr. Harriet Martineau. London: Kegan Paul, Trench, Trübner, & Company Limited.

Coser, Lewis A.
1977 Masters of Sociological Thought: Ideas in Historical and Social Context.

Dubin, Robert
1958 The World of Work. Englewood Cliffs: Prentice-Hall.

Draper, Jean and George B. Strother
1963 "Testing a model for organizational growth." Human Organization 22:180-94.

Durkheim, Emile
1933 The Division of Labor in Society. Glencoe: Free Press.

Eisenstadt, S. N.
1959 "Bureaucracy, bureaucratization, and debureaucratization." Administrative Science Quarterly 4:302-20.

Evers, Frederick T., Joe M. Bohlen, and Richard D. Warren
1976 "The relationships of selected size and structure indicators in economic organizations." Administrative Science Quarterly 21:326-42.

Freeman, John H. and Jerrold E. Kronenfeld
1973 "Problems of definitional dependency: the case of administra-intensity." Social Forces 52:108-21.

Gerth, Hans and C. Wright Mills
1946 From Max Weber: Essays in Sociology. New York: Oxford University Press.

Gordon, C. Wayne and Nicholas Babchuk
1959 "A typology of voluntary associations." American Sociological Review 24:22-29.

Grusky, Oscar
1961 "Corporate size, bureaucratization, and managerial succession." American Journal of Sociology 67:261-69.

Haas, Eugene, Richard H. Hall, and Norman J. Johnson
1963 "The size of the supportive component in organizations: a multi-organizational analysis." Social Forces 42:9-17.

Haire, Mason (ed.)
1959 Modern Organizational Theory. New York: Wiley.

Hall, Richard H., J. Eugene Haas, and Norman J. Johnson
1967 "Organizational size, complexity, and formalization." American Sociological Review 32:903-12.

Hawley, Amos H., Walter Boland, and Margaret Boland
1965 "Population size and administration in institutions of higher education." American Sociological Review 30:252-55.

Hendershot, Gerry E. and Thomas F. James
1972 "Size and growth as determinants of administrative-production ratios in organizations." American Sociological Review 37: 149-53.

Holdaway, Edward A. and Thomas A. Blowers
1971 "Administrative ratios and organization size: a longitudinal examination." American Sociological Review 36:278-86.

Indik, Bernard P.
1963 "Some effects of organization size on member attitudes and behavior." Human Relations 16:369-84.
1964 "The relationship between organizational size and supervision ratio." Administrative Science Quarterly 9:301-12.
1965 "Organizational size and member participation: some empirical tests of alternative explanations." Human Relations 18: 339-50.

Jacobs, Jane
1970 The Economy of Cities. New York: Vintage Books.

Kimberley, John R.
1976 "Organizational size and the structuralist perspective: a review, critique, and proposal." Administrative Science Quarterly 21:571-97.

Lindenfeld, Frank
1961 "Does administrative staff grow as fast as organizations?" School Life 43:20-23.

Melman, Seymour
1951 "The rise of administrative overhead in the manufacturing industries in the United States, 1899-1947." Oxford Economic Papers 3:62-112.
1954 "The rising cost of management." Manchester Guardian 70: 31-32.
1956 Dynamic Factors in Industrial Productivity. New York: Wiley.

Meltzer, Leo and James Salter
1962 "Organizational structure and the performance and job satisfaction of physiologists." American Sociological Review 27: 351-62.

Merton, Robert K.
1957 Social Theory and Social Structure. Glencoe: Free Press.

Meyer, Marshall M.
1972 "Size and the structure of organizations: a causal analysis." American Sociological Review 37:434-41.

Palisi, Bartolomeo J.
1968 "A critical analysis of the voluntary association concept." Sociology and Social Research 52:392-405.

Parkinson, C. Northcote
1957 Parkinson's Law and Other Studies in Administration. New York: Ballantine.

Perrow, Charles
1970 Organizational Analysis: A Sociological View. Belmont, California: Wadsworth.

Raphael, Edna E.
1967 "The Anderson-Warkov hypotheses in local unions: a comparative study." American Sociological Review 32:768-76.

Ruffner, Frederick G., Jr. (ed.)
1971 Encyclopedia of Associations. Detroit: Gale Research Company.
1977 Encyclopedia of Associations. Detroit: Gale Research Company.

Rushing, William A.
1966 "Organizational size and administration: the problem of causal homogeneity and a heterogeneous category." Pacific Sociological Review 9:100-108.
1967 "The effects of industry size and the division of labor on administration." Administrative Science Quarterly 12:273-95.

Sills, David L.
1968 "Voluntary associations: Sociological aspects." International Encyclopedia of the Social Sciences 16:362-79.

Simmel, Georg
1902 "The number of members as determining the sociological form of the group." I and II, American Journal of Sociology 8 (July):1-46; (September):158-96.

Simpson, Richard L. and William H. Gulley
1962 "Goals, environmental pressures, and organizational characteristics." American Sociological Review 27:344-51.

Smith, Constance and Anne Freeman
1972 Voluntary Associations: Perspectives on the Literature. Cambridge: Harvard University Press.

Spencer, Herbert
1895 The Principles of Sociology. Volume I, Part 2. New York: D. Appleton.

Starbuck, William
1965 "Organizational growth and development." Pp. 451-533 in James March (ed.) Handbook of Organizations. Chicago: Rand McNally.

Tannenbaum, Arnold S.
1961 "Control and effectiveness in a voluntary association." American Journal of Sociology 67:33-46.

Terrien, Frederic W. and Donald L. Mills
1955 "The effect of changing size upon the internal structure of organizations." American Sociological Review 20:11-13.

Tosi, Henry and Henry Patt
1967 "Administrative ratios and organizational size." Academy of Management Journal 10:161-68.

Tsouderos, John E.
1955 "Organizational change in terms of a series of selected variables." American Sociological Review 20:206-10.

Udy, Stanley
1959 "The structure of authority in non-industrial production organizations." American Journal of Sociology 64:582-84.

Wolff, Kurt H.
1950 The Sociology of Georg Simmel. Glencoe: Free Press.

VITA

Charles Arthur Pranter

Candidate for the Degree of

Doctor of Philosophy

Thesis: A STUDY OF ORGANIZATION SIZE, ADMINISTRATIVE COMPONENT, AND COMPLEXITY AMONG NATIONAL VOLUNTARY ASSOCIATIONS

Major Field: Sociology

Biographical:

Personal Data: Born in Hot Springs, Arkansas, November 30, 1947, the son of Mr. and Mrs. William D. Pranter.

Education: Graduated from Hot Springs High School, Hot Springs, Arkansas, in May, 1965; received the Bachelor of Arts degree in Psychology and Sociology-Anthropology from Texas Christian University, Fort Worth, Texas, in 1969; received the Master of Arts degree in Sociology from Texas Christian University, Fort Worth, Texas, in 1975; completed requirements for the Doctor of Philosphy degree at Oklahoma State University in May, 1979.

Professional Experience: Graduate teaching associate, Department of Sociology, Oklahoma State University, 1973-1976; instructor, Department of Sociology, Oklahoma State University, 1976-1977; instructor, Department of Behavioral Sciences, Pan American University, 1977-1978; instructor, Department of Sociology, Arkansas State University, 1978-1979.

Professional Organizations: American Sociological Association, Southwest Sociological Association, Oklahoma Sociological Association, Mid-South Sociological Association, Alpha Kappa Delta.