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ORGANIZATIONAL EFFECTIVENESS: A STUDY OF SCHOOL DISTRICTS
IN MICHIGAN

Michigan State University

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1980

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ORGANIZATIONAL EFFECTIVENESS: A STUDY OF
SCHOOL DISTRICTS IN MICHIGAN

By

Clovis Luiz Machado da Silva

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ABSTRACT

ORGANIZATIONAL EFFECTIVENESS: A STUDY OF SCHOOL DISTRICTS IN MICHIGAN

By

Clovis Luiz Machado da Silva

The purpose of this investigation was to analyze school district effects on aggregate levels of student academic achievement from an organizational effectiveness perspective. Employing the comparative method of organizational analysis with an individual school district defined as a case, the researcher tested a causal recursive model of the academic production process of school district organizations that included four environmental input factors (school district size, school district fiscal resources, average income of the families in the school district, and student racial characteristic), four school district organizational attributes (student-faculty ratio, faculty qualifications, faculty distribution, and administrative differentiation), and the selected operative goal of schooling, aggregate student academic achievement. The statistical technique used to test the model was path analysis. The study population was Michigan K-12 school district organizations, and the data were obtained from official documents and records.

The posited model of the academic production process of school district organizations basically was supported by the data. This suggests the adequacy of the framework of analysis used in the study.

The findings and conclusions of the study included the following:

1. Contrary to the frequently held position that schooling makes no difference in students' academic achievement, it was found that at the school district level of analysis, organizational attributes do affect aggregate student academic achievement; yet, this influence is small.

2. School district size has a relevant influence on the structure of school districts in Michigan; its effect is particularly strong on the functional division of managerial and administrative labor of school district organizations. Size also shows indirect effects on aggregate student academic achievement through student-faculty ratio, faculty qualifications, and administrative differentiation; the opposing direction of these indirect effects suggests the difficulties to be faced by policy makers and practicing administrators in regard to the issue of optimal school district size.

3. The amount of fiscal resources available for school districts to operate affects aggregate student academic achievement through its influence on the structure of school districts. The evidence from this study

supports past and continuous efforts to equalize the revenues of school districts with the objective of increasing educational parity.

4. As in input-output studies, the indicator of socioeconomic status (family average income) is the greatest contributor to the explanatory power of the model in regard to aggregate student academic achievement.

5. Finally, the findings from this investigation seem to provide support to (a) the proposition that attributes of school district organizations do mediate, to some degree, the relationships between environmental input factors and aggregate student academic achievement; (b) the conception of educational organizations as being loosely coupled in terms of instructional activities and tightly controlled in terms of ritual classifications and categories; and (c) the commonly accepted position that the technology of instruction is labor intensive, requiring persisting interaction between each individual teacher and his students; this suggests the centrality of the role of teachers to effective school district performance.

To Heloisa, Luciana, and Angela
with love.

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CHAPTER I

INTRODUCTION

Background

The Equality of Educational Opportunity survey (EEO) carried out by Coleman et al. (1966) was not the first major study of relationships between school characteristics and school outcomes, but since this work the issue of school effects has become a growing concern among researchers and policy makers (Erickson, 1977). However, the EEO as well as other studies that have been undertaken to determine input-output (the production-function approach) relationships in education was not conducted from an organizational-effectiveness perspective¹ (Bidwell & Kasarda, 1975; Wagenaar, 1978). Researchers have analyzed relationships between input and output in education without taking into consideration the organizational attributes of schools and school districts.

Even though the call for inquiry into the determinants of school effects from the standpoint of organizational effectiveness can be traced back at least to Halpin (1957), "only in the past ten years have school analysts

¹This term is defined and discussed in a later section of this chapter.

diligently applied the organizational approach to school issues" (Wagenaar, 1978, p. 609).

According to Erickson (1977), four major explanations can be given for the lack of research concerning school effects from the standpoint of organizational effectiveness: (1) the difficulty in obtaining clear evidence of organizational effects in view of the powerful influence of genetic and environmental factors, (2) the constant preoccupation of most scholars with disciplinary concerns; (3) the interdisciplinary effort of some scholars to understand organizations in the abstract, with little regard for specific settings such as education; and (4) the notion, in some universities, that research designed to arrive at implications for policy decisions is inferior.

The development of more sophisticated research methodology and statistical tools, on the one hand, and a change in the perspective of scholars, on the other, have resulted in a growing concern with organizational effectiveness (Steers, 1977). Erickson (1977) attested to this paradigmatic shift: "A deep-seated fixation on organizational process and structure in their own right may be giving way to systematic work on causal models that link structure and process to organizational outcomes, including outcomes that virtually all educational leaders must strive to achieve" (p. x).

As a consequence of this, several investigators have acknowledged the need to carry out research that deals with the issue of school effects from the standpoint of organizational effectiveness (see, for example, Bidwell & Kasarda, 1975; Erickson, 1977; Wagenaar, 1978). There is a growing concern with the use of causal models for studying the effectiveness of educational organizations. This was observed by Erickson (1977), who stated that "we need intense work on causal models linking process and structure to student behavior and long-term accomplishment. We must produce theories of educational organization and educational product" (p. 4). In line with the preceding argument, Bidwell and Kasarda (1975) pointed out the need for causal analytic "school effects" studies in which an attempt is made to determine whether and, if so, how organizational attributes mediate the relationships between environmental input factors and organizational outputs. Bidwell and Kasarda further observed that the need for causal models of organizational effectiveness is not restricted to educational-type organizations but is applicable to all types of organizations. In their words, "We badly need empirical studies, conducted in a variety of organizational settings, that use well defined models of the links between input and output" (p. 55).

Statement of the Problem

In this study the problem of school district effects on aggregate levels of student academic achievement from an organizational-effectiveness perspective was addressed. Employing the comparative method of organizational analysis with an individual school district defined as a case, the researcher attempted to examine hypotheses concerning the links (school district organizational attributes) between inputs (environmental factors) and output (students' academic achievement aggregated at the school district level) using a framework of analysis for studying organizational effectiveness proposed by Bidwell and Kasarda (1975), Steers (1977), and Zey-Ferrell (1979).

Given the posited research problem, the researcher tested a causal recursive model¹ of school district effectiveness that encompassed the following three sets of variables:

1. Concerning school district environmental input factors:
 - a. school district fiscal resources,²
 - b. school district size,
 - c. average income of families in the school district, and
 - d. students' racial characteristic;

¹The proposed causal model is discussed in detail in Chapter III.

²This variable is treated in the singular throughout the dissertation since it constitutes a collective noun.

2. Concerning school district organizational attributes:
 - a. student-faculty ratio,
 - b. faculty qualifications,
 - c. faculty distribution, and
 - d. administrative differentiation; and
3. Concerning school district output: aggregate student academic achievement.

The study population of interest consisted of 508 Michigan K-12 school district organizations out of 530 public K-12 school districts in Michigan during the 1975-76 school year.

Theoretical Framework

Perspectives in the Study of Organizations

Three basic perspectives for studying organizations can be identified in the organizational theory and research literature: the individual perspective, the group perspective, and the organizational perspective (Blau, 1965; Blau & Meyer, 1971).

The individual perspective is focused on "the characteristics and behavior of individuals in their roles as members of organizations" (Blau & Meyer, 1971, p. 81). In a more recent treatment of the matter, Roberts, Hulin, and Rousseau (1978) summarized this perspective as being concerned with individual-level phenomena such as the

relationship between employees' satisfaction and their performance, absenteeism, and turnover. Given that the unit of analysis is the individual, advocates of this perspective assume characteristics of the organization as a whole to be constant.

The group perspective is concerned with "the structure of social relations among individuals in the various groups within the organization" (Blau, 1965, p. 325). Roberts, Hulin, and Rousseau (1978) underscored Blau's characterization, observing that this perspective focuses on the nature of social interactions among group members, examining processes through which group members influence one another's attitudes, perceptions, and behavior. As in the individual perspective, organizational attributes are givens when the group is the unit of analysis.

The organizational perspective¹ entails "the system of interrelated elements that characterizes the organization as a whole" (Blau, 1965, p. 325). These elements are organizational attributes such as division of labor, hierarchy of authority, centralization, and standardization. This perspective, which reflects the structural view of organizations (Perrow, 1970), may focus on the interrelations between the organizational attributes; the relationship

¹The terms "organizational perspective," "organizational approach," "organizational dimension of analysis," and "organizational analysis" have been used interchangeably in the organizational theory and research literature.

between organizational attributes and organizational environment; the relationship between organizational attributes and organizational performance; and the relationship between organizational environment, organizational attributes, and organizational performance (Roberts, Hulin, & Rousseau, 1978; Steers, 1977; Zey-Ferrell, 1979). The unit of analysis is the organization as a whole; therefore, individual behavior and group processes are taken for granted.

Under each of these three perspectives, the attention of the researcher is directed to particular aspects of the organization. As Blau and Meyer (1971) observed, these three perspectives "focus attention upon different phenomena in the study of organizational life" (p. 82). The obvious disadvantage of studying an organization from a particular perspective is that any systematic analysis from one perspective excludes aspects of the organization that might be considered from other perspectives. In addition, each perspective leads to different methodological problems (Blau, 1965; Richardson, 1978; Zey-Ferrell, 1979). The organizational perspective,¹ for example, requires the use of the comparative method of analysis since theoretical explanations of why organizations have certain characteristics and how these characteristics relate to each other depend on comparisons of many organizations (Blau, 1965).

¹For a critique of this perspective, see Argyris (1972).

Strategies Within the Organizational Perspective

Within the organizational perspective, two fundamental theoretical strategies can be identified: the closed-system and the open-system strategy.¹ These two strategies differ basically in terms of the factors that are regarded as functioning as explanatory variables. Under the closed-system strategy, components within the organization are considered as explanatory variables (e.g., structure, technology). With the open-system strategy, on the other hand, environmental factors are regarded as explanatory variables (e.g., resources) since organizations are viewed as adjusting or adapting to their environment (see Hall, 1977; Thompson, 1967; Zey-Ferrell, 1979).

Closed-system strategy.--As described by Hall (1977), Thompson (1967), and Zey-Ferrell (1979), in closed-system strategy a rational view of organizations is taken. Assuming rationality, organizational goals and performance are expected to result from technological, structural, and process factors (explanatory variables) within the organization. It is assumed that if the organization is well

¹The terms "closed-" and "open-systems strategies" (approaches, perspectives, models) have been used interchangeably in the organizational literature. Closed-system and open-system strategies are not used only within the organizational perspective. However, since this researcher adopted the organizational perspective, these strategies are discussed only in this context.

structured it will function as a well-integrated system with a high level of performance. Using this strategy greatly facilitates the work of the researcher since it is not concerned with the dynamics between the organization and its environment; "however, the resulting knowledge is incomplete and often inaccurate" (Zey-Ferrell, 1979, p. 36). On the other hand, Rice and Bishoprick (1971) pointed out that

there never was, and probably never will be, a completely closed system because components are always influenced by forces not being considered--that is, by forces outside the system itself. But closed system analysis as a way of thinking about the interaction of components is extremely useful (p. 165).

Open-system strategy.--Hall (1977), Thompson (1967), and Zey-Ferrell (1979) pointed out that in the open-system strategy organizations are considered to be dependent on factors from the external environment (explanatory variables), and the constant interchange between the external systems and the internal system is recognized. The organization's continual effort to maintain its relationships with the external environment is reflected in the organization's process, technology, structure, and performance. The organization is viewed not as trying to attain goals but rather as meeting its needs for adaptation and survival. Zey-Ferrell (1979) noted that although the open-system strategy offers a relatively comprehensive conceptual framework, it imposes difficulties on the work

of the researcher in view of the abstractness and breadth of the concepts of adaptation and survival as criteria for the assessment of organizational performance.

Combined strategy.--In the past few years, several organizational analysts have attempted to combine the best attributes of both the closed- and the open-system strategies (Zey-Ferrell, 1979). In the combined strategy, the organization is viewed as a goal-seeking entity that is open and constantly adjusting to its environment. The organization is placed in a position of constantly defining, evaluating, and dealing with environmental uncertainty; but at the same time, it is subject to the need for rationality (goal-seeking behavior), requiring predictability and certainty in order to survive (Steers, 1977; Thompson, 1967; Zey-Ferrell, 1979). As Zey-Ferrell (1979) stated, "Organizations attempt to be rational, controlling their internal and external environment to the best of their ability" (p. 44).

Approaches to the Study of Organizational Effectiveness

The present study was concerned with school district organizational effectiveness, i.e., with the issue of "school effects" from the standpoint of the organizational perspective. Approaches to the study of organizational effectiveness vary according to the particular strategy adopted within the organizational perspective: the

closed-system strategy, the open-system strategy, or the combined strategy. The closed-system strategy entails what is known as the goal approach for studying organizational effectiveness; the open-system strategy entails what is known as the system-resource approach for studying organizational effectiveness; finally, the combined strategy comprises more recent attempts (Steers, 1977; Zey-Ferrell, 1979) to produce a combined approach for studying organizational effectiveness--hereafter termed the combined approach.

The traditional approach to the study of organizational effectiveness that has been widely used by organizational researchers is the goal approach (Georgopoulos & Tannenbaum, 1957; Hall, 1977; Price, 1968; Zey-Ferrell, 1979). In the goal approach, effectiveness is defined "in terms of the degree of goal achievement" (Price, 1972, p. 3). It can be seen that the goal concept is central in this definition of organizational effectiveness. According to Etzioni (1964), "An organizational goal is a desired state of affairs which the organization attempts to realize" (p. 6). Keeley (1978) noted that "the idea of organizations as goal-attainment devices is widely accepted by organizational theorists" (p. 272). Moreover, the goal concept is crucial not only to the study of effectiveness but for the whole field of organizational theory as well, since it is the defining characteristic of organizations (Parsons, 1956). In the words of Etzioni (1964), "Organizations are

social units (or human groupings) deliberately constructed and reconstructed to seek specific goals" (p. 3). Thus, in the goal approach, organizational goals express intents, which are translated into yardsticks for assessing organizational effectiveness.

Organizational analysts usually distinguish two types of organizational goals: official and operative. According to Perrow (1961), "Official goals are the general purposes of the organization as put forth in the charter, annual reports, public statements by key executives and other authoritative pronouncements" (p. 855). Operative goals, on the other hand, "designate the ends sought through the actual operating policies of the organization; they tell us what the organization actually is trying to do, regardless of what the official goals say are the aims" (p. 855).

Hall (1977) observed that operative goals can either reflect the official goals of the organization, in that they are abstractions made more concrete, or they might not necessarily have any connection with the official goals. Thus, operative goals reflect the derivation of a set of goals from both official and unofficial sources.

The goal approach summarized above has been criticized by several organizational analysts, especially Etzioni (1964), Katz and Kahn (1966, 1978), and Yuchtman and Seashore (1967). Official goals have been criticized in view

of their nonoperational character; they have been seen to reflect future states that are too vaguely defined to serve as standards for the assessment of organizational effectiveness (Keeley, 1978). On the other hand, two major criticisms are usually made concerning operative goals: (1) organizations usually have multiple and conflicting operative goals that prevent them from being fully effective, and (2) different constituencies may value different operative goals as criteria for assessing organizational effectiveness (Hall, 1977; Keeley, 1978). Thus, despite the recognized importance of goals in studying organizations, they remain a problematic issue for assessing organizational effectiveness.

The goal approach results from a rationalistic view of organizations. This approach is based on the closed-system strategy for studying organizations (Hall, 1977; Thompson, 1967; Zey-Ferrell, 1979). The most widely known alternative conceptual framework for studying organizational effectiveness is the system-resource approach, introduced by Yuchtman and Seashore (1967). According to these organizational analysts, the system-resource approach, which is based on the open-system strategy (Hall, 1977; Thompson, 1967; Zey-Ferrell, 1979), eliminates some of the pitfalls of the goal approach because organizational goals are not considered. Accordingly, organizational effectiveness is defined as the organization's "bargaining position,

as reflected in the ability of the organization, in either absolute or relative terms, to exploit its environment in the acquisition of scarce and valued resources" (Yuchtman & Seashore, 1967, p. 898).

In the system-resource approach, the continuous processes of exchange and competition over scarce and valued resources among organizations determine any particular organization's "bargaining position" in relation to resources and in relation to competing organizations that share all or part of the organization's environment. It is in the arena of exchange and competition over scarce and valued resources that the performance of organizations can be assessed comparatively. An organization is most effective when it "maximizes" its bargaining position and "optimizes" its resource procurement. The idea of optimization instead of maximization of return to the organization in its interaction with its environment is emphasized.

Yuchtman and Seashore (1967) observed that the concept of "bargaining position" implies the exclusion of any specific goal as the ultimate criterion of organizational effectiveness, which eliminates the pitfalls of dealing with organizational goals.

The system-resource approach has been criticized by several organizational analysts (especially by Hall, 1977; Mohr, 1973; Price, 1972; and Steers, 1977). One of the major criticisms of the system-resource approach

concerns its exclusion of goals as standards for the assessment of organizational effectiveness. According to Keeley (1978), advocates of the system-resource approach fall short in the analysis of organizational effectiveness because they "sidestep goal disputes by emphasizing the attainment of means to unspecified goals" (p. 275). Mohr (1973) supported this view:

Unfortunately, without the concept of organizational goal, resource acquisition fails to satisfy as a criterion of effectiveness. . . . In truth, the determination of which resources one should count either must be arbitrary or must appeal to the concept of organizational goal. It is possible to find in some manner that the goal of a specific organization is, purely and simply, to acquire certain resources. If that is not the case, then one must identify other goals in order to establish which resources are important for attaining them" (p. 472).

Moreover, several organizational analysts (Hall, 1977; Steers, 1977; Zey-Ferrell, 1979) have observed that the advocates of the system-resource approach underestimate the utility of the goal approach because they attach the meaning of "ultimate mission" (official goal) to the goal concept and ignore the notion of operative goals, which is regarded as a very workable one for the assessment of organizational effectiveness.

The preceding considerations have led some organizational analysts to regard both approaches as incomplete and unsatisfactory. In fact, the strength of one is the weakness of the other. The strength of the goal approach, defined in terms of operative goals, is its concern for

organizational goals. As Keeley (1978) observed, "The goal approach has one obvious advantage. Though goals may vary from organization to organization, resulting in diverse operating criteria of effectiveness, the goal notion itself does provide a theoretical point of reference for reducing this diversity" (p. 272). Or, in Hall's (1977) words, "In a very real sense, if organizational research is to be anything more than simply descriptive, it must be concerned with goals" (p. 73). Yet, since the goal approach employs a closed-system strategy, it has the weakness of not providing the necessary attention to the relationships between the organization and its environment.

Conversely, the system-resource approach, which employs an open-system strategy, has the strength of concentrating on the relationships between the organization and its environment; its weakness is underestimating the usefulness of operative goals.

It seems that a fruitful strategy would be to combine the strengths of each approach into a single conceptual framework for studying organizational effectiveness. This was suggested by Steers (1977) and Zey-Ferrell (1979), who recognized the complementary character of both approaches. Steers (1977) attempted to formulate this combined conceptual framework; he defined effectiveness "in terms of an organization's capacity to acquire and utilize its scarce and valued resources as expeditiously

as possible in the pursuit of its operative and operational goals" (p. 5). Such a definition of organizational effectiveness is based on both the open-system strategy and the notion that organizations are purposive social units. Thus, it allows for the recognition that a series of environmental constraints as well as the technology and the internal structure of the organization serve to inhibit or facilitate the extent to which goal achievement is optimized.

Organizational Effectiveness in Education

Besides adopting the combined conceptual framework introduced by Steers (1977), it was assumed in this study that organizations, instead of being typified by the same effectiveness criteria, have different characteristics, goals, and constituencies. Each functional type of organization "requires a unique set of effectiveness criteria" (Cameron, 1978, p. 605). Etzioni (1964) underscored this argument, stating that

a well-developed organizational theory will include statements on the functional requirements various organizational types must meet. . . . At present, organizational theory is generally constructed on a high level of abstraction, dealing mainly with general propositions which apply equally well--but also equally badly--to all organizations (p. 18).

Since this research project was concerned with the effectiveness of school districts, which can be classified as a functional type of organization, the operative goal

of schooling that was selected as the criterion variable was students' academic achievement aggregated at the school district level. It has been observed (Thompson, 1967; Hauser, 1972) that the goals of school organizations are many and vaguely defined; hence there is a good deal of disagreement among school personnel concerning the identification of goals and their degree of importance. However, whatever the goals of schooling and whatever their relative importance, students' academic achievement is one of them. There is consensus among policy makers, school personnel, and investigators that academic achievement is one of the most important goals of school organizations. In the words of Bidwell and Kasarda (1975), "While the goals of schooling are many and vague, the academic attainment of students is clearly among them" (p. 57). This statement was reinforced by Wagenaar (1978), who observed that "consensus exists regarding the salience of basic skills achievement as the major goal school personnel emphasize, especially when the day-to-day operations of school are examined" (p. 610).

Given that aggregate student academic achievement was the criterion variable to be used in this study, the following question was set forth: To what extent do school district organizational attributes mediate the relationships between environmental input factors and school district aggregate student academic achievement?

To answer this question, it is necessary to characterize school district organizations and to discuss why their attributes are regarded here as intervening variables between environmental inputs to schooling and the selected operative goal--aggregate student academic achievement.

Characteristics of Educational Organizations

Several organizational analysts have conceptualized educational organizations (schools, school districts) as bureaucracies (Anderson, 1968; Bidwell, 1965; Hoy & Miskel, 1978). Bidwell (1965) observed that school systems display in "rudimentary forms" the following bureaucratic characteristics:

1. a functional division of labor (e.g., the allocation of instructional and coordinative tasks to the school-system roles of teacher and administrator);
2. the definition of staff roles as offices, that is, in terms of recruitment according to merit and competence, legally based tenure, functional specificity of performance, and universalistic, affectively neutral interaction with clients;
3. the hierarchic ordering of offices, providing an authority structure based on the legally defined and circumscribed power of officers, a system of adjudication of staff disputes by reference to superiors, and regularized lines of communication;
4. operation according to rules of procedure, which set limits to the discretionary performance of officers by specifying both the aims and modes of official action (p. 974).

Furthermore, following the work of March and Olsen (1976), Meyer and Rowan (1978), Meyer et al. (1978), Pajak (1979), and Weick (1976), educational organizations were

viewed in this study as bureaucracies that are loosely coupled in terms of instructional activities and tightly controlled in terms of ritual classifications and categories. "Loosely coupling is a term which describes the weakness or relative absence of control, influence, coordination, or interaction between events or parts of an organizational system" (Pajak, 1979, pp. 83-84). Conversely, "tightly controlled" describes the presence of control, influence, coordination, or interaction between events or parts of an organizational system. Awareness of these characteristics of educational organizations is important in understanding the relationship between their organizational structure and their technology, external environment, and operative goals.

Thompson (1967) observed that the nature of the task an organization performs and the environment in which it functions determine in large part its organizational structure. Concerning educational organizations, however, the influence of the external environment upon structure is greater than the influence of the task since structure and instructional activities are loosely coupled (Weick, 1976). That is, instructional activities take place in the isolation of the classroom, receiving only marginal control. As Meyer et al. (1978) stated, "Instructional work tends to go on beyond the purview of the formal organizational structure of the school and district" (p. 259).

Given that educational organizations are loosely coupled in terms of instructional activities, how do they survive and achieve stability, and why do they generally have the same characteristics? The answer suggested by Weick (1976) and further developed in the articles by Meyer and Rowan (1978) and Meyer et al. (1978) is that educational organizations are stable because "they are highly institutionalized, as a structural form, in society" (Meyer et al., 1978, p. 260). That is, the maintenance of tight control over matters of categorization legitimizes and gives meaning to educational organizations' internal processes and at the same time justifies their existence to society. As Pajak (1979) pointed out, in schools and districts students are categorized according to grade level, age, ethnic background, and residence; teachers are categorized as elementary or secondary and according to subject areas and grade levels; curricular topics are assigned to grade levels and teachers; students, teachers, and topics are organized according to specific rules; and so on.

As observed, within this context the environment grows in importance because it is regarded as the major determinant of the structure of school district organizations. It affects the structure of the school district, which, in turn, constrains and facilitates the instructional

activities and, as a consequence, inhibits and facilitates students' academic achievement.

Task-Facilitating and Task-Inhibiting Attributes

The institutionalized structure of school district organizations facilitates aggregate student academic achievement through certain attributes that enhance the instructional process. Conversely, it constrains aggregate student academic achievement through certain attributes that inhibit the instructional process. That is, certain organizational attributes (such as student-faculty ratio) are understood to facilitate instructional activities and, as a consequence, may result in higher student academic achievement. This prediction was derived from the commonly accepted position (Bidwell, 1965; Bidwell & Kasarda, 1975; Wagenaar, 1978) that the technology of instruction is labor intensive, requiring "persisting interaction between an individual teacher and his students" (Bidwell, 1965, p. 975), and that the division of labor in schools provides a great amount of discretionary power to teachers working within the boundaries of the classroom. As Bidwell and Kasarda (1975) pointed out, "The more students a teacher must handle during a class session, the less refined (i.e., the less adaptive to specific performances and characteristics) his response to them is likely to be" (p. 62).

On the other hand, certain organizational attributes (such as administrative differentiation) constrain instructional activities and thus may lower students' academic achievement. This prediction was derived from the preceding argument--that in schools and districts, organizational structure is loosely coupled with instructional activities. Since the organizational structure is derived from the institutionalized rules of the environment and not from the coordinative requirements of instruction, administrative components directed toward exercising control over matters of categorization are likely to constrain the instructional work of teachers, diverting them from instruction and consequently depressing students' academic achievement. As Weick (1976) observed, "the tasks of educational organizations do not constrain the form of the organization but rather this constraint is imposed by the ritual of certification and/or the agreements that are made in and by the environment" (pp. 12-13). However, administrative differentiation does not include only administrative components directed toward exercising control over matters of categorization; it also includes administrative components (such as instructional supervision) that are directed toward contributing to the instructional work of teachers, consequently attempting to increase students' academic achievement. However, given the uncertainty and ambiguity that surround the technology of instruction (Weick, 1976;

Meyer et al., 1978), which engender a great amount of vagueness concerning the link between instructional work (technical means) and students' academic achievement (operative end), it is likely that administrative components directed toward exercising control over matters of categorization would divert the faculty from instructional work at a rate not overcome by administrative components directed toward contributing to instructional work (see Bidwell & Kasarda, 1975). Thus, overall, it is likely that administrative differentiation decreases aggregate student academic achievement.

The obvious proposition that follows the preceding considerations is that organizational attributes that facilitate instructional activities, hereafter referred to as task-facilitating attributes, will increase aggregate student academic achievement, and organizational attributes that inhibit instructional activities, hereafter referred to as task-inhibiting attributes, will lower aggregate student academic achievement.

Summary of the Theoretical Framework

The theoretical framework used in this study to assess school district effectiveness comprises three basic components: environmental input factors, school district organizational attributes, and the criterion variable--aggregate student academic achievement. In view of the

preceding arguments, school district organizational attributes were regarded as intervening variables between environmental input factors and aggregate student academic achievement. It was observed, however, that a school district does not relate to its environment as a passive element; rather, the relationship is one of exchange. School districts receive inputs from the environment and produce outputs for the environment. The environment imposes constraints upon school districts, and school districts place constraints on the elements in their environments.

The selection of the variables that compose the causal model tested in this study as well as the hypotheses depicted in it was influenced by Bidwell and Kasarda's (1975) "Model of School District Organization and Student Achievement," the preceding theoretical discussion, findings of empirical research reported in Chapter II, special features of the study population, and anticipated data availability.

Limitations and Considerations of the Study

A limitation of this research is that the school district output variable, aggregate student academic achievement, was measured only at the elementary-school level. This limitation was a result of the nonexistence of standardized achievement tests for the study population

of interest at the secondary-school level. Since the other variables included in the proposed causal model reflected measures of the whole school district, it was necessary to assume proportional relations of these variables concerning elementary- and secondary-school levels across school districts. As a consequence, the results were cautiously interpreted as reflecting school district effectiveness at the elementary-school level.

Also, this study was somewhat limited by the absence of a direct measure of student ability since the need to include this factor in any type of study of "school effects" is generally acknowledged in view of its relationship to student achievement (see, for example, Alexander & Griffin, 1976a, 1976b; Hannan, Freeman, & Meyer, 1976; Hanushek, 1970; Hanushek & Kain, 1972; Spady, 1973).

Nevertheless, no measure of students' ability is available for all school districts in Michigan. Furthermore, conventional measures such as IQ scores are generally regarded as inadequate (Bidwell & Kasarda, 1976b; Hanushek, 1970; Whimbey & Whimbey, 1975). As a consequence, this researcher used two proxy measures¹ of aggregate student ability and motivation, which are generally regarded as reasonably sound at the aggregate level to circumvent the most serious problems (see Bidwell & Kasarda, 1976b; Hanushek, 1970).

¹These proxy measures are discussed in Chapter III.

A particularly important point to be kept in mind throughout this dissertation is that this was a study of the effectiveness of educational organizations at the school district level of analysis.¹ As such, it was concerned with the overall "academic production process" of school district organizations and not with a theory of academic achievement of individual students. That is, the fundamental concern was with students' academic achievement aggregated at the school district level of analysis and not with individual students' academic achievement. This concern with aggregate-level research is clearly expressed in the theoretical frame of reference and in the posited research problem. It follows that the proposed causal model attempted to explain between-district variation in aggregate levels of student academic achievement.

Contributions of the Study

This study contributes to organizational effectiveness research and theory in general, and to school district effectiveness research and theory in particular, by testing a causal recursive model that depicts how the organization of school districts mediates the relationship

¹This position is based on Bidwell and Kasarda's arguments (1975, 1976a, 1976b). For a criticism of this position, see Alexander and Griffin (1976a, 1976b) and Hannan, Freeman and Meyer (1976). For other considerations, see also Borgatta and Jackson (1979) and Roberts, Hulin, and Rousseau (1978, pp. 81-109).

between educational inputs and output. The acknowledgment that this way of thinking about organizational effectiveness is a fruitful one has been increasing in the pertinent literature in the last few years (see, especially, Bidwell & Kasarda, 1975; Erickson, 1977; Steers, 1977; Zey-Ferrell, 1979).

Furthermore, this investigation has the potential to provide important information for practicing administrators. From the standpoint of policy decisions, several of the tested hypotheses encompass variables that can be manipulated by school administrators with the goal of improving aggregate student academic achievement.

Nevertheless, a word of caution is necessary: Because this study follows a new theoretical approach to the study of organizational effectiveness in general and to the study of school district effectiveness in particular, there is the need for repeated research using further elaborated models before any attempt is made to draw conclusive policy recommendations.

Overview of the Study

This study is organized in five chapters. The introductory chapter provided the background, the research problem, the theoretical framework, the limitations, and the anticipated contributions of the investigation. The second chapter is concerned with the review of related

literature. In the third chapter, the hypothetical causal model is diagrammatically presented, along with the rationale for each hypothesis and for the network of relations that compose the explanation of school district organizational effectiveness. This chapter also includes overall considerations of the statistical methodology used for testing the model and a brief description of the study population and data-collection procedures. In the fourth chapter, the findings are analyzed, and the goodness of fit of the hypothesized model is discussed. Finally, the fifth chapter contains a summary of the findings and conclusions of the study, as well as recommendations for further research.

CHAPTER II

REVIEW OF RELATED LITERATURE

Introduction

The review of related literature in this chapter is presented in two parts. In the first part, research findings concerning "school effects" from input-output studies--the educational production-function approach--are reviewed. In the second part of the chapter, research findings concerning "school effects" from organizational-effectiveness investigations are reported.

Input-Output Studies

In this section, the findings of a number of empirical investigations of "school effects" that have used the "educational production-function approach" are reviewed. The general formulation of the educational production function that underlies most of the input-output studies has been expressed and discussed by several scholars (see, for example, Averch et al., 1972; Hanushek, 1970; Levin, 1976).

One such presentation and discussion of the general formulation of the educational production function was provided by Averch and associates (1972) in their review of

several substantial input-output studies. In their presentation, it can be observed that in most input-output studies a student's educational outcome is regarded as some function of the following three sets of variables:

1. Student's background factors, which include measures of his/her family and/or community socioeconomic status and the racial composition of the student body and/or the community;

2. Peer group influences, which usually include measures of aspirations, attitudes, motivation, and educational attainment of the student's classmates; and

3. School resources, which include measures of a variety of school factors such as teachers' qualifications, teachers' experience, pupil-teacher ratio, per pupil expenditures, and number of library books per pupil (pp. 31-36).

Averch and associates' preceding formulation of the educational production function is basically in line with the ones provided by Levin (1976) and Hanushek (1970), except it excludes any consideration of students' initial or innate endowments. Averch and associates' exclusion of students' initial or innate endowments in their version of the general formulation of educational production function is understandable since this factor is usually omitted in input-output studies, given the current difficulties in obtaining a reliable measure of this

concept (Hanushek, 1970; Hanushek & Kain, 1972; Levin, 1970). Nevertheless, it is important to point out that the absence of any measure of initial or innate endowment may be a source of specification biases (Hanushek & Kain, 1972; Levin, 1970, 1976; Spady, 1973). As Hanushek and Kain (1972) observed,

If innate ability is independent of the explanatory variables included in the model, it simply will increase the size of the error term--that is, reduce the amount of variance explained by the model. But, if within the sample experience it is correlated positively with any of the explanatory variables, its influences will be represented by these included explanatory variables (p. 129).

The basic research problem in the input-output approach is to identify the relationships between inputs and output, i.e., the extent to which output variations can be explained by input variations. Multiple regression is the statistical technique used most often to estimate the relationships between inputs and output (Averch et al., 1972; Campbell, Bridges, & Nystrand, 1977; Cohn & associates, 1975).

The intended policy implication of input-output studies is that once the relative effectiveness of each school resource is identified, administrators can make optimum use of those resources to improve students' educational outcomes (Averch et al., 1972; New York State Education Department, 1972). According to Levin (1976), school resources inputs "are of particular interest to economists in their quest for efficiency, for these resources

represent the ones that are purchased by the school budget and for which resource allocation decisions can be made" (pp. 292-93).

Although most investigators using the input-output approach have acknowledged that schools are multi-purpose organizations, their studies have usually included only output defined in terms of students' cognitive achievement as measured by standardized achievement tests (Averch et al., 1972; New York State Education Department, 1972). The common inclusion of only cognitive output is a result of the present lack of knowledge regarding noncognitive outputs of schooling (Levin, 1976). Several investigators have already discussed the limitations imposed by the use of such a single output measure (see, for example, Averch et al., 1972; Cohn, 1972, 1979; Cohn & associates, 1975; Gintis, 1971; Levin, 1976; Spady, 1973).

The best-known input-output study is the Equality of Educational Opportunity survey (EEO) conducted by Coleman et al. (1966). As Erickson (1977) observed, the

EEO was not, of course, the first major sophisticated study of relationships between school characteristics and valued school outcomes. . . . But EEO commanded such interest from the academic community (as well as from elsewhere) that it may be regarded as a major catalyst of the current growing research thrust in the area of "school effects" (p. 112).

According to Smith (1972), Coleman and his associates assumed that the following five sets of variables additively determine a student's achievement:

1. His home background experience,
2. The characteristics of his student-body peers,
3. The school's facilities and curriculum,
4. His teacher's characteristics,
5. Other unmeasured factors of his heredity and environment (p. 234).

Applying this linear statistical model to the data collected, Coleman et al. (1966) arrived at the following conclusions regarding the relationships between these sets of variables and students' academic achievement:

1. The great importance of family background for achievement;
2. The fact that the relation of family background to achievement does not diminish over the years of school;
3. The relatively small amount of school-to-school variation that is not accounted for by differences in family background, indicating the small independent effect of variations in school facilities, curriculum, and staff upon achievement;
4. The small amount of variance in achievement explicitly accounted for by variations in facilities and curriculum;
5. Given the fact that no school factors account for much variation in achievement, teachers' characteristics account for more than any other characteristics of the school;
6. The fact that the social composition of the student body is more highly related to achievement, independently of the student's own social background, than is any school factors;
7. The fact that attitudes such as a sense of control of the environment, or a belief in the responsiveness of the environment, are extremely highly related to achievement, but appear to be little influenced by variations in school characteristics (p. 325).

The overall conclusion in the report was that "schools bring little influence to bear on a child's achievement that is independent of his background and general social context. . ." (Coleman et al., 1966, p. 325).

The Report by Coleman and his associates was the object of a number of criticisms by several scholars. Some of the criticism focused on inadequacies of the data, particularly the relatively low response rate, the possibility of nonrandomness in the pattern of responses, and the treatment of nonresponses to particular questionnaire items. Other criticisms concerned the methodology and interpretation of results, the basic argument being that in the measurement of variables and selection of statistical techniques, the EEO survey was biased toward underestimation of the importance of school characteristics in students' academic achievement (see Bowles & Levin, 1968a, 1968b; Cain & Watts, 1970, 1973; Carver, 1975; Erickson, 1977; Hanushek & Kain, 1972; Herriott & Muse, 1973; Jencks, 1972; Spady, 1973).

Within the realm of methodology and interpretation of results, a specific criticism by Bowles and Levin (1968a) is especially important in this investigation's framework: It refers to the probable overestimation of the effect of students' background factors on their academic achievement; i.e., given that students' background factors and school resources are correlated, Coleman and associates' decision to enter students' background factors into the regression equation before school resources resulted in their attributing entirely to students' background factors the variance in achievement that both sets

share. As a consequence, "the importance of background factors in accounting for differences in achievement is systematically inflated and the role of school resources is consistently underestimated" (Bowles & Lewin, 1968a, p. 16).

A reexamination of the EEO survey data undertaken by an interdisciplinary faculty seminar on the Coleman Report at Harvard University addressed, among other things, the aforementioned criticism by Bowles and Lewin. The work of members of this seminar, examining the magnitude of the variance accounted for by the resources measures before controlling for background variables, failed to support the criticism that the fraction of total variance explained by school resources is seriously understated in the Coleman Report (Smith, 1968). Overall, the reanalysis of the EEO data by members of the seminar upheld the major findings and interpretations presented in the Coleman Report (see Mosteller & Moynihan, 1972).

Jencks (1972) raised several technical criticisms of the Coleman Report. However, in his subsequent reanalysis of the data of the EEO, Jencks basically concluded that schools make little difference in students' achievement.

Bidwell and Kasarda (1975) addressed a different type of criticism to the EEO survey. They observed that Coleman and his associates did not take into consideration that organizational attributes might mediate or affect the

relationships between environmental input factors and students' academic achievement. The Coleman Report

did not consider how between-school differences in such organization attributes as the division of labor, formalization of teaching activities, supervision of teaching, or the morphology of control might have mediated or otherwise affected relationships between inputs to schools and pupil achievement (Bidwell & Kasarda, 1975, p. 56).

They added that

Despite the reanalyses reported in the Mosteller-Moynihan volume, there are good reasons to suspend judgment about the negative conclusions of EEO. Some of these are technical and center largely on errors of measurement. . . . Others are substantive and have to do with the failure of EEO to take school and school district into account" (p. 56).

In addition to the EEO survey, many other input-output studies have been carried out by investigators from different disciplinary backgrounds (Averch et al., 1972). Several of these studies have used the EEO data file; others have employed different data sources. Several reviews of input-output studies can be found in the literature (see, for example, Averch et al., 1972; Cohn & associates, 1975; Guthrie, 1970; Guthrie et al., 1971; New York State Education Department, 1972; Spady, 1973).

The major drawbacks of the EEO survey are also present in many of the input-output studies reviewed here, although several of them have used improved statistical methodology. Several analysts (Averch et al., 1972; Cohn & associates, 1975; Spady, 1973) have discussed the basic

difficulties faced by input-output researchers. Three of these difficulties that are especially important within this investigation's framework are listed below:

1. The lack of direct measures of student ability and motivation, which inflates the estimated impact of background factors on students' academic achievement since background factors may act, to some degree, as proxy measures of student ability and motivation;

2. The shared variance in students' achievement because of the high correlation of background factors and school resources, which cannot be exclusively attributed to either one given the simultaneous variations of both factors with students' achievement; and

3. The use of different levels of data aggregation (e.g., individual and school) within individual-level research designs.

All of the input-output studies discussed below have used some kind of student cognitive achievement score, usually measured by some type of achievement test, as the indicator of educational output. A few of them also have included some kind of noncognitive output as a criterion variable, but only the findings concerning the relationships between inputs and students' cognitive output are reviewed. Also, given the large number of variables usually analyzed in input-output studies, this review is restricted to those variables regarded as

essential in any educational production-function investigation and to the variables most frequently used in these studies that are of interest in this dissertation.

In terms of level of data aggregation, the unit of analysis most often employed in these investigations was the school and the school with some variables at the individual student level. A few of these studies have used school district, and even fewer have employed the individual student as the unit of analysis.

Students' Background Factors

One of the inputs regarded as essential in any educational production-function study is student background (Averch et al., 1972; New York State Education Department, 1972). Measures of student background usually included in input-output studies are indicators of family socioeconomic status (parents' education, average family income, father's occupation) and, less frequently, measures of community socioeconomic status.

Despite the variation in model specification found in the literature, in every study included in previous reviews of research, students' background factors were found to be consistently related to their academic achievement (Averch et al., 1972; Cohn & associates, 1975; Guthrie et al., 1971; New York State Education Department, 1972).

Students' Racial Characteristic

In its review of input-output studies that have examined the relationship between students' race and academic achievement, the New York State Education Department (1972) observed that even though the relationship had been found to be statistically significant in every research analyzed, the association would probably be clarified by analyzing students' race as a proxy measure of other factors such as socioeconomic status. In fact, the relationship between student body racial composition and students' achievement was the object of a great deal of controversy in the input-output studies literature.

The basic questions underlying this controversy are:

- (1) To what extent does racial composition function as a proxy variable picking up variation in students' achievement due primarily to omitted dimensions of students' background factors and to additional variance, if any, resulting from school social-class composition? and
- (2) Does racial composition have a unique effect on students' achievement after controlling for all dimensions of students' background factors and school social class?

The input-output studies reviewed in this research have provided no conclusive answers to the latter question; empirical evidence is contradictory and confusing, at best. Concerning the first question, several investigators have suggested that student body racial composition acts, at

least in part, as a proxy measure of omitted dimensions of students' background factors and of additional variance, if any, due to school social-class composition (Bowles & Levin, 1968a; Cohen, Pettigrew, & Riley, 1972; Mayeske et al., 1969; McPartland, 1969; Smith, 1972).

Students' Ability

Many input-output studies have not included a direct measure of student ability because of the difficulties involved in dealing with such a concept. Researchers who have attempted to account directly for student ability have used student IQ as the indicator. In all these studies, student IQ was found to be significantly related to student academic achievement (see, for example, Campbell et al., 1968; Gerberich, 1951; Goodman, 1959; Lavin, 1965; New York State Education Department, 1967a, 1967b, 1968; Wohlferd, Armstrong, & Curtis, 1968).

The appropriateness of using student IQ as an indicator of student ability is open to discussion (Hanushek, 1970; Hanushek & Kain, 1972). Several scholars have regarded the use of student IQ in input-output studies as problematic (Bidwell & Kasarda, 1976a, 1976b; Hanushek, 1970; Hanushek & Kain, 1972). These individuals have pointed out the importance of student ability measures in models of "school effects," recognizing, however, the present difficulty in obtaining reliable

measures of such a concept. As a consequence, students' background factors have been considered as reflecting to some extent students' ability and motivation (Spady, 1973). Several researchers have pointed out the major drawbacks of using students' background factors as proxy measures in school effects studies (Alexander & Griffin, 1976a, 1976b; Hannan, Freeman, & Meyer, 1976; Hanushek, 1970; Spady, 1973). Yet the use of such proxy measures of student ability is regarded as less problematic in aggregate-level "school effects" research than in individual-level designs (Bidwell & Kasarda, 1976b; Hanushek, 1970).

School and School District Size

The relationship between school or school district size and students' academic achievement was examined in several of the studies included in this review. The typical variable analyzed was school size because most of these studies focused on the school as the unit of analysis. The few investigators who have examined the relationship between school district size and academic achievement are Benson et al. (1965), Cohn (1968), Kiesling (1967, 1969, 1970), and Raymond (1968). School or school district size is most frequently indicated by total number of students enrolled or by average daily student attendance. Most researchers have found no relationship between school or

school district size and students' academic achievement (Alkin, Benson, & Gustafson, 1968; Cohn, 1968; Kiesling, 1967, 1968, 1969; Mollenkopf & Melville, 1956). Some researchers have found both a negative and no relationship between size and students' academic achievement (Burkhead, Fox, & Holland, 1967; Guthrie et al., 1971; Smith, 1972). Finally, Benson et al. (1965), Katzman (1968), and Summers and Wolfe (1975) found a positive relationship between size and students' academic achievement--Benson within a range of small school districts.

These inconsistent and contradictory findings seem to reflect the input-output studies' inadequate approach when testing for the relationship between school or school district size and students' academic achievement. This conclusion is based on previous theoretical and empirical analyses by organizational researchers (Bidwell & Kasarda, 1975; Price, 1968; Wagenaar, 1978) who have pointed out that size may affect organizational outcomes primarily through its intermediary effects on organizational attributes. That is, school or school district size may not affect students' academic achievement directly but rather indirectly through intervening organizational attributes that may be related to academic achievement.

Fiscal Resources

The financial-expenditures variables most often analyzed in input-output studies are expenditures per pupil and teachers' salaries. Other financial-expenditures variables, such as administrators' salaries and expenditures for materials, have been used less frequently.

The assessment of the relationship between the financial-expenditures factors and students' academic achievement has been problematic in input-output research, because of the apparent overlap and contradictions among and between these variables and other resource variables expressed in descriptive units such as teachers' qualifications, teachers' experience, pupil-teacher ratio, and number of special staff per pupil. For example, several input-output studies have examined the relationship between teachers' salaries and students' academic achievement, entering in the same regression equation other variables such as teachers' qualifications and teachers' experience, which are highly correlated with teachers' salaries (Bowles & Levin, 1968a; New York State Education Department, 1972; Spady, 1973). Also, these researchers have usually introduced controls on students' background factors that are correlated with school resources (Bowles & Levin, 1968a, 1968b; Hanushek & Kain, 1972; Spady, 1973).

Given the researcher's purpose in this study, the present review was focused on the overall financial variable,

expenditures per pupil, because of its inclusiveness and importance as a basic environmental input factor to schooling. Expenditures per pupil is usually indicated by the amount of fiscal resources (local, state, and federal) received by the school district per pupil.

The input-output studies that have examined the relationship between expenditures per pupil and students' academic achievement have shown inconsistent and contradictory findings. In several of these studies, a positive relationship between these two variables was found (Bowles, 1969; Cheal, 1962; Goodman, 1959; Kiesling, 1968; New York State Education Department, 1967a, 1967b; Ribich, 1968; Thomas, 1962). On the other hand, Kiesling (1967) found a positive relationship between these two factors in school districts with an enrollment of at least 2,000 students and no relationship in school districts with fewer than 2,000 students. Kiesling (1969) found a negative relationship between these two variables in urban school districts and no relationship in rural school districts. Finally, several other investigators have found no relationship between expenditures per pupil and students' academic achievement (Alkin, Benson, & Gustafson, 1968; Gerberich, 1951; James, Thomas, & Dyck, 1963; Wohlfert, Armstrong, & Curtis, 1968).

Several scholars have attempted to interpret inconsistent and contradictory findings like the ones

reported above concerning the relationship between expenditures per pupil (fiscal resources) and the output, students' academic achievement, the most frequently discussed argument being the inadequate control on students' background factors given their association with school resources (see, especially, Bowles & Levin, 1968a, 1968b; Guthrie et al., 1971; Hanushek & Kain, 1972; Spady, 1973).

Although these interpretations provide important insights concerning the relationship between these two factors, in this study the findings reported above are considered likely to be expected by this researcher in view of the inadequate approach used in these investigations. That is, in the reported investigations the researchers attempted to examine the direct relationship between fiscal resources and output. It was observed elsewhere (Bidwell & Kasarda, 1975; New York State Education Department, 1972), though, that the effect of fiscal resources on output is indirect; i.e., fiscal resources may affect output only indirectly through acquiring educational resources that may or may not influence the level of output. Fiscal resources might be used to acquire resources (e.g., better-qualified teachers) that may influence positively the level of output; fiscal resources might also be spent to acquire resources (e.g., transportation) that may be unrelated to students' academic achievement; finally, funds may be used to acquire resources (e.g., greater administrative differentiation)

that may influence negatively the level of output. Consequently, a more appropriate approach to examining the relationship between fiscal resources and students' academic achievement would be to identify the important intervening organizational variables, which are referred to in input-output studies as school resources.

Teachers' Characteristics

The concern with the relationship between teachers' characteristics and students' academic achievement was present in the input-output studies literature long before Coleman and associates (1966) observed that teachers' characteristics account for more variation in achievement than do any other characteristics of the school. After the Coleman Report, the researchers' attempts to delineate teacher characteristics that can influence students' academic achievement increased greatly (State of New York, 1974).

The two teacher characteristics most frequently analyzed in input-output studies have been teachers' experience and teachers' qualifications. These two variables have been found to be highly correlated with the financial-expenditures variable, teachers' salaries; i.e., a teacher's salary is typically based on his/her qualifications and experience (see, for example, Cohn & associates, 1975; New York State Education Department, 1972; Spady, 1973).

The evidence from empirical research is important in the context of the present investigation since teachers' salaries constitute a substantial proportion of overall financial expenditure, which is examined here as an important environmental input factor to school district organizations.

The analysis of the relationship between teachers' experience and students' academic achievement in input-output studies has resulted in contradictory findings. In several investigations, the relationship between these two factors was found to be positive (Boardman, Davis, & Sanday, 1973; Burkhead, Fox, & Holland, 1967; Goodman, 1959; Hanushek, 1968; Katzman, 1968; Levin, 1970; Michelson, 1970; Summers & Wolfe, 1975; Thomas, 1962). Other investigators have found mixed results: positive and negative relationships (Kiesling, 1970) and a few positive but mainly no significant relationships (Guthrie et al., 1971). Still others have found the relationship to be negative (New York State Education Department, 1967a, 1967b). Finally, some investigators have found no significant relationship between the two factors (Kiesling, 1967, 1969; Smith, 1972).

Spady (1973) interpreted these dubious findings as the result of assuming a linear relationship between teachers' experience and students' academic achievement; he observed that the relationship is more likely nonlinear

than linear: Teacher effectiveness might increase up to a certain number of years of work and "beyond a given point, age and experience will quite likely inhibit capacity to learn and grow on the job" (p. 151). Cohn & associates (1975) underscored Spady's argument to some extent, observing that teacher experience can be regarded as both a positive and a negative school resource because it can reflect better skills to handle the job as well as professional obsolescence.

Also, the analysis of the relationship between teachers' qualifications and students' academic achievement has provided mixed findings. Several investigators have found a positive relationship between these two factors (Bowles, 1969; Cheal, 1962; Katzman, 1968; New York State Education Department, 1967a; Summers & Wolfe, 1975). On the other hand, Kiesling (1970) found both positive and negative relationships between these two factors. In a few other studies, no relationship was evident between teachers' qualifications and students' academic achievement (Burkhead, Fox, & Holland, 1967; Hanushek, 1970; Kiesling, 1967; Smith, 1972).

Several researchers have attempted to interpret mixed findings like the ones reported above concerning the relationship between teachers' qualifications and students' academic achievement, the most frequently discussed argument being the inadequate control for students'

background factors given their correlation with school resources (see, especially, Bowles & Levin, 1968a, 1968b; Hanushek & Kain, 1972; Spady, 1973).

The present researcher regards the above findings as to be expected from input-output studies since the approach used does not take into consideration that organizational attributes of schools and districts (such as teachers' qualifications) may mediate the relationship between environmental input factors (such as fiscal resources) and aggregate student academic achievement (see Bidwell & Kasarda, 1975).

In light of this argument, inconsistent findings from input-output studies concerning the relationship between other factors regarded as organizational attributes and students' academic achievement are also expected. Two other organizational attributes analyzed in the context of input-output studies are of interest in this investigation: administrative characteristics and pupil-teacher ratio.

Only a few input-output studies reviewed by this researcher have examined the relationship between administrative characteristics and students' academic achievement. Benson et al. (1965) found the ratio of teachers to administrators to be negatively related to students' academic achievement for small and middle-sized school districts and to be positively related to students' academic

achievement for the largest school districts. Kiesling (1965) reported a significant negative relationship between administrator-pupil ratio and students' academic achievement. Burkhead, Fox, and Holland (1967) and Kiesling (1969, 1970), on the other hand, found no relationship between administrator-pupil ratio and students' academic achievement. Finally, Cohn and associates (1975) reported mixed results: positive and no significant relationships between administrator-pupil ratio and students' academic achievement.

In several of the input-output studies reviewed in this section, the relationship between pupil-teacher ratio and students' academic achievement was examined. Boardman and Sanday (1973), Campbell et al. (1968), Katzman (1968), Kiesling (1965, 1968), and Mollenkopf and Melville (1956) found significant relationships between these two factors. Yet Kiesling (1969, 1970) reported both a significant relationship and no relationship between these two factors. Finally, Benson et al. (1965), Bowles (1970), Burkhead, Fox, and Holland (1967), Cohn (1968), Katzman (1971), Kiesling (1967), and Raymond (1968) found no relationship between pupil-teacher ratio and students' academic achievement.

The preceding summary of research findings from many input-output studies showed the failure of the input-output approach to yield consistent results, which has been

the focus of much criticism (Alexander & Eckland, 1975; Averch et al., 1972; Richer, 1975; Spady, 1973). As Averch et al. (1972) observed,

The results from the input-output approach do not mean that school resources fail, actually or potentially, to affect student outcomes. We simply observe that so far these studies have failed to show that school resources do affect student outcomes (p. 148).

Aside from the methodological criticisms summarized by Spady (1973), recent criticisms have been addressed to the atheoretical nature of "school effects" studies (Alexander & Eckland, 1975; Richer, 1975). As the New York State Education Department (1972) observed,

In the absence of a well specified theory of production for education, the investigator is relegated to the role of guessing or playing his hunches about what variables play an important role in the creation of some definition of educational output (p. 10).

It seems that "the absence of a well specified theory of production for education," which underlies input-output studies, is a result of the failure of advocates of such an approach to take into consideration the characteristics of educational organizations (see Bidwell & Kasarda, 1975). That is, any attempt to specify a theory of production for education must take into account how components of educational organizations (e.g., structure, technology, and performance) relate to each other and to environmental factors (see Bidwell, 1979; Bidwell & Kasarda, 1975; Steers, 1977; Zey-Ferrell, 1979).

In light of these considerations, the inconsistent findings from input-output studies might be tentatively interpreted as the result of not accounting for the distinctive characteristics of educational organizations. If this interpretation is valid, the analysis of "school effects" from the organizational-effectiveness perspective adopted in this investigation (the combined approach discussed in Chapter I) might provide more consistent results than the ones found by input-output researchers.

Organizational-Effectiveness Studies

Only two studies of "school effects" upon aggregate levels of student academic achievement from an organizational-effectiveness perspective were found in the pertinent literature. These two investigations were conducted recently by Bidwell and Kasarda (1975) and Wagenaar (1978).

The study by Wagenaar (1978) involved a sample of 135 out of 233 elementary schools in a large midwestern city. The limitations of Wagenaar's study are evident because by adopting the closed-system strategy, which entails the goal approach for studying organizational effectiveness, he disregarded the dynamics that govern the relationships between schools and their environments. Using the school as the unit of analysis, Wagenaar examined

the relationship between students' academic achievement aggregated at the school level (criterion variable) and several structural attributes (explanatory variables), with and without controlling for students' families' socioeconomic status. The statistical technique used for data analysis was stepwise multiple regression.

The findings of Wagenaar's study relevant to the variables of interest to this investigation were as follows:

1. A mild positive relationship between specialized training (teachers' qualifications) and aggregate student academic achievement,

2. A positive relationship between students' families' socioeconomic status and aggregate student academic achievement,

3. An indirect positive effect of socioeconomic status on aggregate student academic achievement through specialized training, and

4. No relationship between school size and aggregate student academic achievement.

The finding of no direct relationship between school size and aggregate student academic achievement is to be expected, given the aforementioned argument that size may be related to academic achievement primarily indirectly through its intermediary effect on organizational attributes that may be related to academic achievement.

Surprisingly, Wagenaar, who specifically stated in his study that "size may not be as important in and of itself as it is important for its effect on other internal structural variables" (p. 612), adopted an approach for studying organizational effectiveness that did not allow him to test for indirect effects of school size on aggregate student academic achievement.

Bidwell and Kasarda's (1975) study "is an unusually well-conceived" (Erickson, 1977, p. 119) investigation of school district effectiveness in the state of Colorado. These authors suggested a new analytical framework for studying the effectiveness of educational organizations that is basically in line with the combined approach to the study of organizational effectiveness discussed in the first chapter of this dissertation. The question posed by Bidwell and Kasarda was "whether and how attributes of school district organization affect the transformation of environmental inputs into students' aggregate levels of academic achievement" (p. 56). To answer this question, the authors investigated 104 out of 178 public K-12 school districts in Colorado during the 1969-1970 school year. Using the school district as the unit of analysis, they examined the relationships between five environmental input factors (school district size, school district fiscal resources, percentage of disadvantaged students, education of parent-risk population, and

percentage of nonwhite population), four organizational attributes (pupil-teacher ratio, administrative intensity, professional support staff, and certificated staff qualifications), and the organizational-effectiveness criterion, aggregate student academic achievement. These variables were linked in a causal recursive model in which environmental input factors were hypothesized to affect aggregate student academic achievement primarily through their effects on the intervening organizational attributes. Regression analysis techniques were used to test the posited hypotheses and the goodness of fit of the causal model. Bidwell and Kasarda's findings are summarized below:

1. Relationships between environmental input factors and organizational attributes:

- a. Administrative intensity was affected only by school district size, declining across districts as size increased.

- b. School district fiscal resources showed a significant positive effect on the relative numbers of professional support staff; the larger the amount of fiscal resources, the larger the proportion of professional support staff.

- c. Percentage of disadvantaged students and education of parent-risk population showed no effect on professional support staff.

d. School district size showed a significant positive effect on pupil-teacher ratio; as enrollment increased, so did the average number of students per teacher.

e. School district fiscal resources showed a significant negative effect on pupil-teacher ratio; the larger the amount of fiscal resources, the smaller the number of students per teacher.

f. School district size, school district fiscal resources, percentage of disadvantaged students, and education of parent-risk population¹ showed a significant positive effect on certificated staff qualifications.

g. Percentage of nonwhite population showed no influence on pupil-teacher ratio, administrative intensity, professional support staff, or certificated staff qualifications.

2. Relationships between environmental input factors and aggregate student academic achievement, controlling for the intervening organizational attributes:

a. Percentage of nonwhite population showed a negative effect on aggregate student academic achievement.

¹Defined in terms of "the percent of males 20-49 years old and females 15-44 years old residing in the school district who had completed at least 4 years of high school education" (Bidwell & Kasarda, 1975, p. 59).

b. School district size, school district fiscal resources, percentage of disadvantaged students, and education of parent-risk population showed no direct effect on aggregate student academic achievement.

3. Relationships between organizational attributes and aggregate student academic achievement:

a. Pupil-teacher ratio showed a significant negative effect on aggregate student academic achievement; as pupil-teacher ratios declined, across districts, aggregate student academic achievement rose.

b. Administrative intensity showed a significant negative effect on aggregate student academic achievement; as administrative intensity rose, aggregate student academic achievement declined.

c. Certificated staff qualifications showed a significant positive effect on aggregate student reading achievement and no effect on aggregate student mathematics achievement.

d. Professional support staff showed no effect on aggregate student academic achievement.

4. Direct and indirect causal effects of environmental input factors on aggregate student academic achievement, based on the full model, including all possible causal paths:

a. School district size showed no direct effect on aggregate student academic achievement. Its indirect effects were opposing: Large size improved aggregate student academic achievement by decreasing administrative intensity and raising certificated staff qualifications, and it lowered aggregate student academic achievement by increasing pupil-teacher ratios.

b. School district fiscal resources showed no direct effect and a significant indirect effect on aggregate student academic achievement through lowering pupil-teacher ratio and raising certificated staff qualifications.

c. Percentage of disadvantaged students showed no direct effect and no indirect effect on aggregate student academic achievement.

d. Education of parent-risk population showed no direct effect on aggregate student reading achievement and a direct positive effect on aggregate student mathematics achievement. Its indirect effects, through raising certificated staff qualifications, were positive on aggregate student reading achievement and negligible on aggregate student mathematics achievement.

e. Percentage of nonwhite population showed a negative direct effect on aggregate student

academic achievement, independent of other variables in the causal model (pp. 63-68).

On the basis of these findings, Bidwell and Kasarda concluded that organizational attributes are significantly related to aggregate student academic achievement. They interpreted the failure of input-output investigators to find consistent and articulated results of "school effects" as a result of the fact that these investigators did not take into account the characteristics of educational organizations. That is, input-output investigators did not consider that organizational attributes could mediate the relationships between environmental input factors and the output, aggregate student academic achievement.

Conclusions From the Review

In the first part of this chapter, the input-output approach for studying the effectiveness of schools was presented along with a summary of research findings from many input-output investigations. It was observed that the input-output approach failed to yield consistent results. This lack of consistency of findings was interpreted as resulting from the failure of input-output investigators to take into account that attributes of educational organizations may mediate the relationships between environmental input factors and aggregate

student academic achievement. Therefore, it was suggested that the analysis of "school effects" from the organizational-effectiveness perspective adopted in this dissertation (the combined approach discussed in the first chapter) could provide more consistent results than the ones provided in input-output studies. In the second part of this chapter, the results of the only investigation in which the combined approach was used were reported. These results provided evidence of the fruitfulness of the framework of analysis proposed by the authors, basically supporting the posited causal model. Based on the results of this study, the authors concluded that attributes of educational organizations do have an effect on their academic output.

In synthesis, the combined approach for studying the effectiveness of educational organizations seems to yield meaningful results, as illustrated by the only investigation that has used the approach until now. Further work is not only advisable but highly necessary to accumulate empirical evidence that would provide for an adequate assessment and elaboration of the approach. The need for further work is especially evident, given the implications of findings from investigations of school effects for educational policy and practice. As a consequence, the present study was designed to test a causal recursive model of school district effectiveness formulated

on the basis of the theoretical frame of reference of this combined approach (presented in detail in the first chapter), the findings of empirical research reported above, special features of the study population, and anticipated data availability.

CHAPTER III

A MODEL OF SCHOOL DISTRICT EFFECTIVENESS

Overview

The presentation in this chapter is divided into three sections. In the first section, a causal recursive model of school district effectiveness is introduced; for clarity, the diagrammatic representation of the model comes first and the discussion of the postulated relationships follows. In the second section, "Method of Analysis," the technique used to test the assumed causal scheme is discussed and the path diagram of the postulated relationships is drawn. Finally, in the third section, a brief description of the study population is provided, along with a discussion of data-collection procedures and some comments regarding the variables indicated in the model.

A Causal Recursive Model of School District Effectiveness

In the first chapter, it was suggested that the combined approach for studying the effectiveness of organizations is the most suitable one because it allows for the recognition that environmental factors as well as the technology and internal structural attributes

of the organization serve to inhibit or facilitate the extent to which goal achievement is optimized.

Based on the combined approach and the conceptualization of educational organizations as bureaucracies that are loosely coupled in terms of instructional activities and tightly controlled in terms of ritual classifications and categories, this researcher discussed how environmental factors, technology, structural attributes, and the selected operative goal (aggregate student academic achievement) of educational organizations are likely to be related to each other. Basically, it was suggested that school district organizational attributes (classified as task-facilitating and task-inhibiting attributes) may mediate the relationships between environmental input factors and aggregate student academic achievement.

Given this theoretical frame of reference, research findings reported in Chapter II, and anticipated data availability, the researcher proposes an explanation of school district effectiveness, which is diagrammatically represented in Figure 1 and discussed in detail on the following pages.

The causal model represented graphically in Figure 1 is recursive, which means that there are no feedback loops or reciprocal linkages; i.e., the causal flow is unidirectional. The model contains three types of variables: exogenous, endogenous, and residual. The

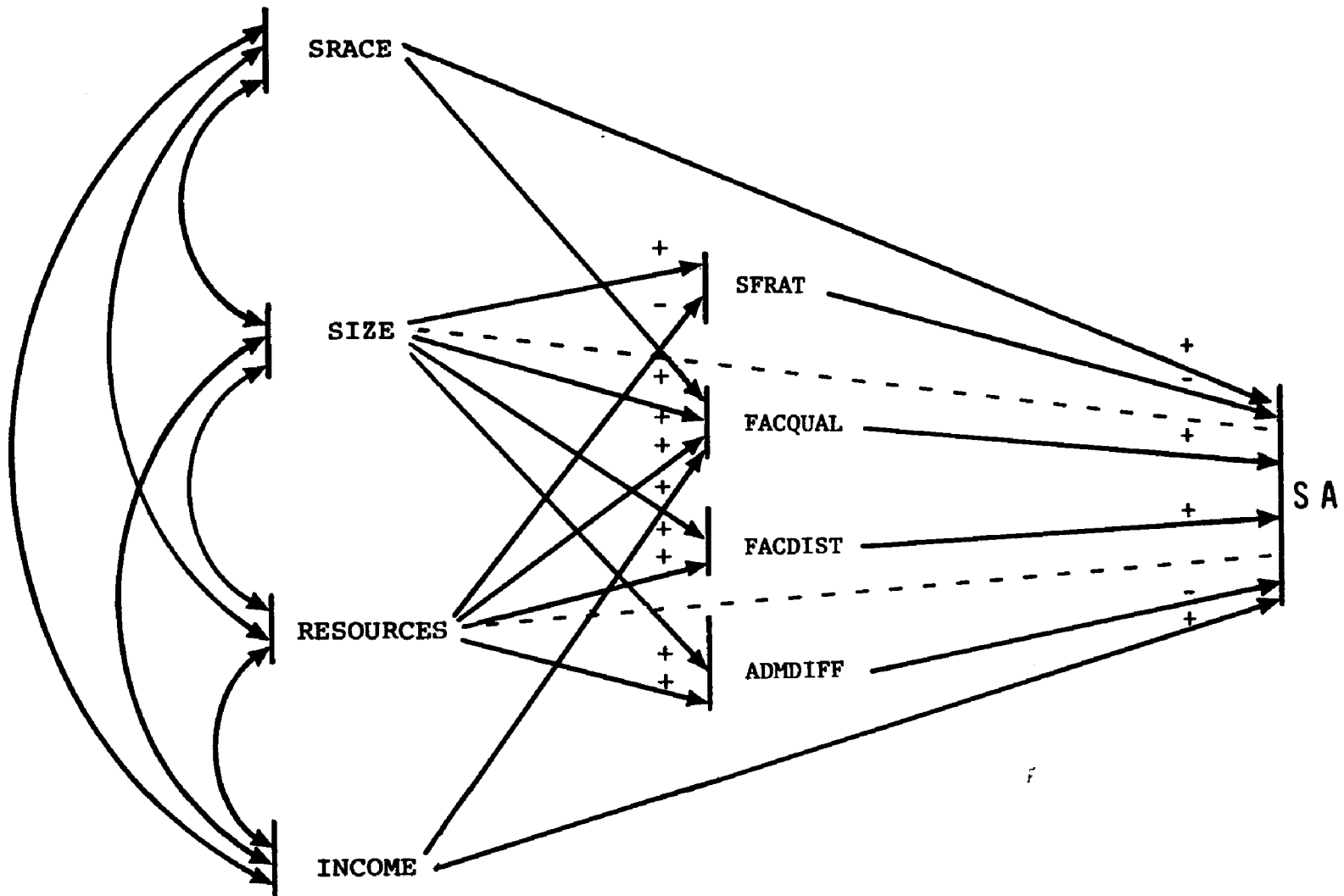


Figure 1.--A causal recursive model of school district effectiveness.

exogenous variables are assumed to be predetermined; i.e., their variability is assumed to be caused by factors outside the causal model under consideration. No attempt is made to explain their variability or their intercorrelations since this is not a problem to be considered for the posited system. Thus, the intercorrelations (noncausal correlations) between exogenous variables are symbolized by two-headed curvilinear arrows to distinguish them from causal arrows. The endogenous variables are taken to be influenced by exogenous variables and by exogenous and/or other endogenous variables in the model. Finally, the residual variables¹ indicate the variance of the endogenous variables that is not explained by variables included in the model (see Kerlinger & Pedhazur, 1973; Land, 1969).

Variables² included in the model (Figure 1) are as follows:

- a. Exogenous variables (environmental input factors):

SRACE = student racial characteristic

SIZE = school district size

¹The residual variables are not represented in Figure 1, to simplify the drawing of arrow diagrams. See Figure 2 for a technical representation of the model.

²The operational definitions of these variables are provided in Appendix A.

RESOURCES = school district fiscal resources

INCOME = average income of families in the
school district

- b. Endogenous variables (school district organizational attributes):

SFRAT = student-faculty ratio

FACQUAL = faculty qualifications

FACDIST = faculty distribution

ADMDIFF = administrative differentiation

- c. Endogenous variables (school district operative goal = output):

SA = aggregate student academic achievement

The postulated causal relations between the variables included in the model are represented by unidirectional arrows extending from the variables taken as causes to those taken as effects. For example, SFRAT is considered to be dependent on SIZE and RESOURCES.

Plus signs are used to indicate direct positive effects from the variables taken as causes to those taken as effects. Minus signs indicate direct negative effects from the variables taken as causes to those taken as effects.

The dotted lines symbolize relationships that could not be hypothesized. The meaning of the two dotted lines in the model is further clarified in the following discussion, under the headings "School district fiscal resources and aggregate student academic achievement" and

"School district size and aggregate student academic achievement."

The Postulated Relationships:
Explanation and Discussion

Bidwell and Kasarda (1975) observed that the "problem for school districts is to transform such inputs as students, resources, staff, technology and community preferences into such outputs as student achievement, operating within limits set by law and public policy" (p. 57). Thus, certain environmental constraints constitute the conditions under which a school district must operate. The relationships between the three sets of variables--environmental input factors, organizational attributes, and aggregate student academic achievement--are postulated on the following pages.

School district fiscal resources and aggregate student academic achievement.--One environmental constraint is the amount of fiscal resources that a school district receives in a given year in order to carry out its activities. Following Bidwell and Kasarda's work (1975), this investigator proposes that fiscal resources affects the output, aggregate student academic achievement, primarily through its effects on intervening organizational variables. In other words, fiscal resources by itself does not affect the output; it affects the output through its effects on

intervening organizational variables that are related to the output.

This researcher points out that this proposition is contingent on the intervening organizational variables included in the causal model, given the zero-order correlation coefficients between fiscal resources and output and between fiscal resources and other environmental input factors. That is, given the intercorrelations between environmental input factors, if the suggested causal model is fully specified (i.e., it contains all significant intervening organizational variables between fiscal resources and output), then no direct effect of fiscal resources upon the output would be observed. Conversely, given the zero-order correlation coefficient between fiscal resources and output and the intercorrelations between fiscal resources and other environmental input factors if the suggested causal model is not fully specified, then three alternative results are conceivable, depending on the task-facilitating and the task-inhibiting intervening variables included in the model: (1) no direct effect of fiscal resources on output, (2) a direct positive effect of fiscal resources on output, and (3) a direct negative effect of fiscal resources on output.

Previous researchers have not determined the significant intervening organizational variables between fiscal resources and output that are to be included in a causal

model within this framework of analysis; therefore, any of the preceding three conceivable alternatives may occur as a result of testing for the relationship between fiscal resources and output. The posited causal model is no exception. In this research, analysis might reveal that fiscal resources has no direct relationship to output or that it has a direct positive or negative relationship to output.

As a consequence, no hypothesis concerning the direct relationship between fiscal resources and output is advanced; only hypotheses concerning the indirect effects of fiscal resources on output through intervening organizational variables are stated in this investigation. The result of testing for the direct relationship between fiscal resources and the output, aggregate student academic achievement, is analyzed on the basis of the preceding considerations.

The hypotheses concerning indirect effects of fiscal resources on aggregate student academic achievement through the selected intervening organizational variables are as follows:

Hypothesis 1: School district fiscal resources will show an indirect positive effect on aggregate student academic achievement through its effect on student-faculty ratio.

Hypothesis 2: School district fiscal resources will show an indirect positive effect on aggregate student academic achievement through its effect on faculty qualifications.

Hypothesis 3: School district fiscal resources will show an indirect positive effect on aggregate student academic achievement through its effect on faculty distribution.

Hypothesis 4: School district fiscal resources will show an indirect negative effect on aggregate student academic achievement through its effect on administrative differentiation.

It seems that the preceding proposition (and consequent considerations and hypotheses) more adequately reflects the pattern of relationship between resources and output than does the proposition underlying the "input-output approach"--that fiscal resources is directly and positively related to student academic achievement.

School district fiscal resources and organizational attributes.--The rationale for each hypothesis concerning the relationships between fiscal resources and organizational attributes is given below. The relationships between organizational attributes and output are examined later in this section.

In Chapter I, educational organizations were conceptualized as being loosely coupled in terms of instructional activities. According to Meyer and Rowan (1978), Meyer et al. (1978), and Weick (1976), the instructional looseness of educational organizations is a result of the uncertainty and ambiguity that surround the technology of instruction. For example, "the technology of teaching is notoriously unclear" (Meyer et al., 1978, p. 236) and

"education is a diffuse task, the technology is uncertain" (Weick, 1976, p. 12).

The uncertainty and ambiguity of educational technology provide for and are evidenced by the fact that in educational organizations, instructional activities typically are not subject to systematic evaluation and inspection (Bidwell, 1965; Dornbusch & Scott, 1975; Dreeben, 1973; Lortie, 1973). It follows that the link between instructional work (technical means) and students' academic achievement (operative end) is unclear (Bidwell, 1965; Dornbusch & Scott, 1975).

Within educational organizations, the allocation of resources to the production process is not based on previous assessment of alternative technical means to achieve the operative end. The basic expenses of a school district organization concerning its production process conform to prevailing institutional rules of the wider system. That is, the widely shared understandings about the nature of education create a context within which enough agreement exists to direct allocation of fiscal resources to organizational attributes that legitimize and give meaning to school production procedures.

One such organizational attribute is student-faculty ratio. The institutionalized rule concerning this variable is that the smaller the number of students assigned to each teacher, the greater the level of students' academic

achievement (Meyer & Rowan, 1978; Meyer et al., 1978).

It is to be expected, then, that school district organizations use fiscal resources to lower the number of students assigned to each teacher. This proposition was tested by Bidwell and Kasarda (1975), who found the hypothesized negative relationship between fiscal resources and student-faculty ratio to be statistically significant. On the basis of these arguments and findings, the following hypothesis is examined:

Hypothesis 5: School district fiscal resources will show a direct negative effect on student-faculty ratio.

Another organizational attribute selected to be examined here is faculty qualifications. The institutionalized rule concerning this variable is that better-qualified teachers (as indicated by academic degrees and courses in particular topic areas from accredited institutions) render better services, which increases the level of students' academic achievement (Meyer & Rowan, 1978; Meyer et al., 1978). Thus, it is to be expected that school district organizations use fiscal resources to increase the proportion of better-qualified faculty in the district. Bidwell and Kasarda (1975) tested this proposition and found the hypothesized positive relationship between fiscal resources and faculty qualifications to be statistically significant. Therefore, the following hypothesis is examined:

Hypothesis 6: School district fiscal resources will show a direct positive effect on faculty qualifications.

A third organizational attribute selected to be examined here is faculty distribution, which is a measure of the degree of functional division of labor within school district organizations. Faculty distribution indicates the extent to which faculty members are within a relatively small number of the 81 faculty assignment categories (reading, mathematics, elementary education, and so on) or are evenly distributed across a broad range of these assignment categories. This variable indicates the extent of faculty specialization within and among more general teaching assignment categories such as elementary education and social sciences. It also indicates the breadth and depth of curricular topics offered by school districts (Richardson, 1978). Using the formula¹ introduced by Gibbs and Martin (1962) and further discussed by Gibbs and Browning (1966), faculty distribution is a better indicator of depth than of breadth of curricular topics.

It seems reasonable to assume that diversification and depth of curricular topics are valued by educators and the community, especially when considered in terms of the higher grade levels. It is to be expected that school

¹ $1 - [\sum X^2 / (\sum X)^2]$ = formula for the measurement of the degree of division of labor.

district organizations use fiscal resources to achieve a greater faculty distribution. Consequently, the following hypothesis is suggested:

Hypothesis 7: School district fiscal resources will show a direct positive effect on faculty distribution.

The final organizational attribute selected for examination here is administrative differentiation.

According to Richardson (1978), administrative differentiation

refers to the functional division of managerial and administrative labor in school district organizations, and thus provides a context for the consideration of both hierarchy of authority and administrative apparatus (p. 125).

It is expected that school district organizations direct a small amount of fiscal resources to administrative differentiation. This statement follows the adopted conception of educational organizations as being loosely coupled in terms of instructional activities and tightly controlled in terms of ritual classifications and categories. Since tight organizational control is only exercised over matters of categorization (such areas as the credentialing and hiring of teachers, the assignment of students to classes and teachers, and scheduling), the need in educational organizations for highly specialized administrative tasks is somewhat lowered. As Meyer and Rowan (1978) observed, in educational organizations the "logic of confidence" is adopted:

Higher levels of the system organize on the assumption that what is going on at lower levels makes sense and conforms to rules, but they avoid inspecting it to discover or assume responsibility for inconsistencies and ineffectiveness (p. 80).

Therefore, Meyer and Rowan observed, "Administrators and other district staff make up a very small proportion of the total employees of most school districts" (p. 91). In light of these arguments, the following hypothesis is examined:

Hypothesis 8: School district fiscal resources will show a small direct positive effect on administrative differentiation.

School district size and aggregate student academic achievement.--Concerning the environmental input factor, school district size, it is also proposed here that it affects the output, aggregate student academic achievement, primarily through its effects on intervening organizational variables (Bidwell & Kasarda, 1975; Wagenaar, 1978). In other words, size per se does not affect output; rather, it affects output through its effects on intervening organizational variables that are related to output.

It is advanced here that this proposition is contingent on the intervening organizational variables included in the model, given the interrelationships between size and other environmental input factors. That is, given the intercorrelations between size and other environmental input factors if the suggested causal model is fully specified, then no direct effect of size on output would be

observed. On the other hand, given the intercorrelations between size and other environmental input factors if the causal model does not contain all significant intervening organizational variables between size and output (i.e., the model is not fully specified), then three alternative results are conceivable, depending on the task-facilitating and the task-inhibiting intervening variables included in the model: (1) no direct effect of size on output, (2) a direct positive effect of size on output, and (3) a direct negative effect of size on output.

Previous researchers have not indicated whether the suggested causal model contains all significant intervening organizational variables between size and output; hence any of the three conceivable alternatives may occur as a result of testing for the relationship between size and output. For this reason, no hypothesis concerning the direct relationship between size and output is advanced. Only hypotheses concerning the indirect effects of size on output through intervening organizational variables are stated. The result of testing for the direct relationship between size and output, aggregate student academic achievement, is analyzed on the basis of the preceding considerations.

The hypotheses concerning indirect effects of size on aggregate student academic achievement through the selected intervening organizational variables are as follows:

Hypothesis 9: School district size will show an indirect negative effect on aggregate student academic achievement through its effect on student-faculty ratio.

Hypothesis 10: School district size will show an indirect positive effect on aggregate student academic achievement through its effect on faculty qualifications.

Hypothesis 11: School district size will show an indirect positive effect on aggregate student academic achievement through its effect on faculty distribution.

Hypothesis 12: School district size will show an indirect negative effect on aggregate student academic achievement through its effect on administrative differentiation.

School district size and organizational attributes.--The rationale for each hypothesis concerning the relationships between size and organizational attributes is given below. The relationships between organizational attributes and output are examined later in this section.

Size is one of the ecological variables that has received a great amount of attention from organizational researchers (Wagenaar, 1978). Size is the environmental variable most frequently conceptualized as being associated with organizational structure (Zey-Ferrell, 1979). Corwin (1974), Hall (1977), and Zey-Ferrell (1979) observed that there has been an intense dispute among organizational analysts concerning the significance, strength, and direction of the association between size and organizational structure.

Hall (1963) and Hall, Haas, and Johnson (1967) stated that size is no more important than other factors in understanding organizational structure. On the other hand, Blau (1970), Blau and Schoenherr (1971), and Meyer (1972a, 1972b) suggested that size has a causal effect on organizational structure. Meyer's (1972b) longitudinal analysis supported the argument that size might have a causal effect on some aspects of organizational structure.

This researcher concurs with the latter argument, assuming that size has a causal effect on some structural variables. In adopting this perspective, the investigator goes against Woodward (1965) and Thompson's (1967) argument that the tasks and technology of organizations are better predictors of structure than is size. This researcher's position is based on the adopted conception of educational organizations as being loosely coupled in terms of instructional activities and tightly controlled in terms of ritual classifications and categories. As previously observed, at least in reference to educational organizations it seems that environmental factors are better predictors of structure than are tasks and technology since instructional work and structure are loosely coupled (Meyer & Rowan, 1978; Meyer et al., 1978; Weick, 1976).

Given these considerations, the environmental variable, size, is regarded here as causally related to the four organizational attributes examined in this

investigation: student-faculty ratio, faculty qualifications, faculty distribution, and administrative differentiation.

Bidwell (1965) and Bidwell and Kasarda (1975) observed that school district organizations are not able to select students in terms of total number to be served or in terms of their ability and motivation since educational policy requires the enrollment of all students who present themselves in any given year. According to these organizational analysts, input buffering and rationing are the basic means available to school districts for adapting to student input since fiscal resources is relatively fixed in the short run. In other words, "given the high probability of rationing as a response to growths in enrollment and to large enrollments given fixed resources, per-pupil shares of teachers should decline across districts as enrollment increases" (Bidwell & Kasarda, 1975, p. 61). These researchers found evidence to support this hypothesis in their 1975 study of 104 school districts in Colorado. Conversely, given relatively fixed fiscal resources, it is to be expected that decline in enrollment will lower the number of students assigned to each teacher. As a consequence, the following hypothesis is examined:

Hypothesis 13: School district size will show a direct positive effect on student-faculty ratio.

Concerning the relationship between size and faculty qualifications, Bidwell and Kasarda (1975) observed that

since enrollment is usually a correlate of community size, number of pupils should have a positive direct effect on teachers' qualifications. Larger places are likely to have larger pools of well-qualified teachers to draw from, to provide attractive employment for the spouses of married teachers and to afford more of the amenities of life that attract and hold competent teachers (p. 61).

These researchers found evidence to support this hypothesis in their 1975 study of selected Colorado school districts. The following hypothesis is examined in the present research:

Hypothesis 14: School district size will show a direct positive effect on faculty qualifications.

The third organizational attribute selected here as being affected by the environmental input, size, is faculty distribution, which is an indicator of the school district functional division of labor. Richardson (1978) observed that "one consistent finding in the organizational research literature is the positive correlation between size and the complexity of an organization's division of labor, regardless of the indicators used to measure either variable" (p. 24). Corwin (1970) also found a positive relationship between size and several indicators of the division of labor, which included a measure of faculty specialization. In view of these findings, the following hypothesis is examined:

Hypothesis 15: School district size will show a direct positive effect on faculty distribution.

The fourth organizational attribute selected here as being affected by the environmental input size is administrative differentiation, which is an indicator of the degree of functional division of managerial and administrative labor in school district organizations. It is expected that a direct positive effect of size on administrative differentiation will be found. This statement is supported by the research of Blau and Schoenherr (1971), Child and Mansfield (1972), and Pugh and associates (1969, 1970), who found size to be a major determinant of organizational structure. Richardson (1978) found size (indicated by the total number of school district faculty) to be positively related to administrative differentiation. The following hypothesis is examined in the present study:

Hypothesis 16: School district size will show a direct positive effect on administrative differentiation.

Average income of families and student racial characteristic .--Average income of families in the school district is a direct indicator of the socioeconomic level of the community. In the school effects literature, average family income is one of the frequently used indicators of students' socioeconomic status (New York State Education Department, 1972). Student racial

characteristic¹ is regarded here as a proxy measure of community and students' socioeconomic level, reflecting additional variance of socioeconomic status, which is not represented by the single indicator, average income of families in the school district.

These two environmental input factors are regarded here as (1) proxy measures of parental and community preferences and expectations concerning the school district and (2) proxy measures of aggregate student cognitive ability and motivation (see Bidwell & Kasarda, 1975, 1976a, 1976b). Furthermore, the inclusion of these two factors in any school effects study is regarded as crucial since they have consistently been noted to affect students' academic achievement, as observed in the summary of research findings from school effects studies in Chapter II.

In this investigation the organizational perspective for studying the effectiveness of school district organizations is employed; hence this researcher proposes that these two environmental input factors (average income of families in the school district and student racial

¹This variable is frequently used in school effects studies as reflecting both sociocultural and socioeconomic factors (State of New York, 1974). Given the ambiguity that surrounds the sociocultural dimension of this variable (see Chapter II of this paper), this researcher decided to take into consideration only its socioeconomic dimension, also discussed in the second chapter of this paper (see, for example, Bowles & Levin, 1968a; Cohen, Pettigrew, & Riley, 1972).

characteristic) primarily and directly affect aggregate student academic achievement, and affect student achievement only secondarily through their effects on the intervening organizational attribute, faculty qualifications.

The proposition concerning the direct effects of these two environmental input factors on the output, aggregate student academic achievement, follows research findings summarized in the second chapter of this dissertation. The proposition that these two factors also affect the output through their effects on faculty qualifications follows Bidwell and Kasarda's (1975) argument that the higher the socioeconomic level of the community, the higher the community's demand for better-qualified teachers. Therefore, the following hypotheses concerning these two environmental input factors are examined in this investigation:

Hypothesis 17: Average income of families in the school district will show a direct positive effect on aggregate student academic achievement.

Hypothesis 18: Average income of families in the school district will show a direct positive effect on faculty qualifications.

Hypothesis 19: Average income of families in the school district will show an indirect positive effect on aggregate student academic achievement through its effect on faculty qualifications.

Hypothesis 20: Student racial characteristic will show a direct positive effect on aggregate student academic achievement.

Hypothesis 21: Student racial characteristic will show a direct positive effect on faculty qualifications.

Hypothesis 22: Student racial characteristic will show an indirect positive effect on aggregate student academic achievement through its effect on faculty qualifications.

Organizational attributes and aggregate student academic achievement.--Previous investigators (see Chapter II of this paper) have found either a relationship between student-faculty ratio and students' academic achievement or no relationship between these two variables. However, most of these investigators have used the input-output approach, which is not adequate--either theoretically or methodologically--to represent the complex set of relationships that characterize school or school district academic process of production. The only research known to the writer that has used an organizational-effectiveness perspective following the framework of analysis adopted in this investigation was carried out by Bidwell and Kasarda (1975), who found evidence that the smaller the student-faculty ratio, the greater the aggregate level of student academic achievement. The basic argument posited by these organizational analysts to support this hypothesis and finding follows the conception of instruction as being labor-intensive, involving feedback-responses between teacher and student, and taking place in the isolation of classrooms; thus, the smaller the teacher's span of control, the more adaptive

to specific performances and characteristics his/her response to students is likely to be. On the basis of these considerations, the following hypothesis is examined:

Hypothesis 23: The task-facilitating student-faculty ratio will show a negative direct effect on aggregate student academic achievement.

Investigators using the input-output approach, discussed in Chapter II, have reported mixed findings concerning the relationship between teachers' qualifications and students' academic achievement. As already observed, however, the input-output approach is not theoretically and methodologically adequate to represent the complex network of relations that characterize school or school district academic process of production. Wagenaar (1978), using an organizational-effectiveness approach but following a framework of analysis that differs from the one adopted in this research, found a positive relationship between teachers' qualifications and students' academic achievement. Employing the framework of analysis adopted in this research, Bidwell and Kasarda (1975) also found teachers' qualifications to be positively related to the school district's level of student academic achievement. The basic argument supporting these findings is that the teacher-intensive character of instruction requires improved teaching skills, which is assumed to be related to higher levels of college training. Based on these

arguments and findings, the following hypothesis is examined:

Hypothesis 24: The task-facilitating faculty qualifications will show a direct positive effect on aggregate student academic achievement.

The third organizational attribute selected to be examined in relation to the school district's level of student academic achievement is faculty distribution, which is a measure of the functional division of labor of school district organizations. As previously observed, faculty distribution indicates the extent of faculty specialization within and among more general teaching assignment categories; it is a better indicator of extent of specialization within than among teaching assignment categories.

Given the nature of this variable, it is expected it will be positively related to aggregate student academic achievement. The rationale for this prediction is straightforward: because of the labor-intensive character of the technology of teaching, it is to be expected that more specialized teachers can provide better services in such crucial areas as reading and mathematics than can less specialized teachers. This prediction was supported by Pelz (1956), who noted that differentiation among and within occupational specialties may contribute to a higher degree of organizational performance. Also, this prediction was supported by Price's (1968) proposition that

"organizations which have a high degree of division of labor are more likely to have a high degree of effectiveness than organizations which have a low degree of division of labor" (p. 16). On the basis of these arguments, the following hypothesis is examined:

Hypothesis 25: The task-facilitating faculty distribution will show a direct positive effect on aggregate student academic achievement.

The fourth and last organizational attribute to be examined in relation to the school district's level of student academic achievement is administrative differentiation, which is an indicator of the functional division of managerial and administrative labor of school district organizations. Overall, this variable is regarded as a task-inhibiting organizational attribute. As such, it is expected to be negatively related to aggregate student academic achievement. This prediction is supported by the posited argument that schools are loosely coupled, and therefore some organizational attributes constrain instructional activities. Since administrative components are mainly derived from the institutionalized rules of the environment and not by the coordinative requirements of instruction, it is likely that administrative differentiation mainly constrains the instructional work of teachers, consequently depressing the district's level of student academic achievement. That is, as administrators are more highly differentiated among more highly specialized

positions and functions, their coordination and control over matters of categorization should increase at a rate not overcome by their contributions toward the instructional work of teachers; thus, in balance, they should divert teachers from their instructional activities. As a consequence, the amount and quality of professional services provided by teachers to students is lowered, which depresses the district's level of student academic achievement (see Biddle, 1970; Bidwell & Kasarda, 1975; Blau, 1960; Leavitt, 1958; Williams, 1971). Based on these arguments, the following hypothesis is examined:

Hypothesis 26: The task-inhibiting administrative differentiation will show a direct negative effect on aggregate student academic achievement.

Method of Analysis

The preceding material was an extended discussion of how environmental input factors and school district organizational attributes relate to each other and to aggregate student academic achievement. The postulated system of relationships among these variables constitutes a theory of school district organizational effectiveness. Given that these variables are assumed to be measured on an interval scale and that the relationships among the variables in the explanatory scheme are assumed to be unidirectional, linear, additive, and causal, path analysis is the technique used to test the theoretical

model. Another assumption that must be met for the proper use of path analysis is that the residuals are mutually uncorrelated and also uncorrelated with other variables in the system (see Heise, 1969; Kerlinger & Pedhazur, 1973; Land, 1969).

Provided the foregoing assumptions are met, path analysis is a suitable analytical tool for testing the proposed theoretical model. It is important to observe that path analysis is not a method for generating theory. Rather, it is a technique appropriate for testing theory; i.e., it gives the implications of a particular system in which the causal ordering and the nature of the causal connections of variables have already been specified. By using path analysis, it is possible to verify whether a pattern of correlations for a set of observations is consistent with the postulated explanatory scheme (see Kerlinger & Pedhazur, 1973). In brief, path analysis allows the researcher to evaluate the causal process assumed to operate among the variables considered in the theoretical model through the decomposition of the zero-order correlation between variables into a sum of simple (direct effect of one variable on another) and compound paths (some being meaningful indirect effects and others perhaps not) (Alwin & Hauser, 1975; Asher, 1976).

Given these preliminary considerations, the proposed theory of school district effectiveness is

represented in the path diagram depicted in Figure 2,
where:

X_1 , X_2 , X_3 , and X_4 are identified as exogenous variables since they are assumed to be pre-determined;

X_5 , X_6 , X_7 , X_8 , and X_9 are considered endogenous variables because they are taken to be influenced by other variables in the model;

X_a , X_b , X_c , X_d , and X_e are residual or unmeasured variables that are introduced to account for the variance of the endogenous variables not explained by variables included in the model;

The path coefficients (p 's) indicate the direct effect of one variable on another; and

The zero-order correlation coefficients (r 's) represent noncausal correlations between exogenous variables.

The causal recursive model depicted in the path diagram in Figure 2 can be expressed mathematically in a set of structural equations. Since only the endogenous variables are to be explained, the following set of recursive equations emerges¹:

¹It can be observed that there is no constant term in the equations; this is due to the assumption that all variables are normalized with mean of zero and standard deviation of one (Blalock, 1969).

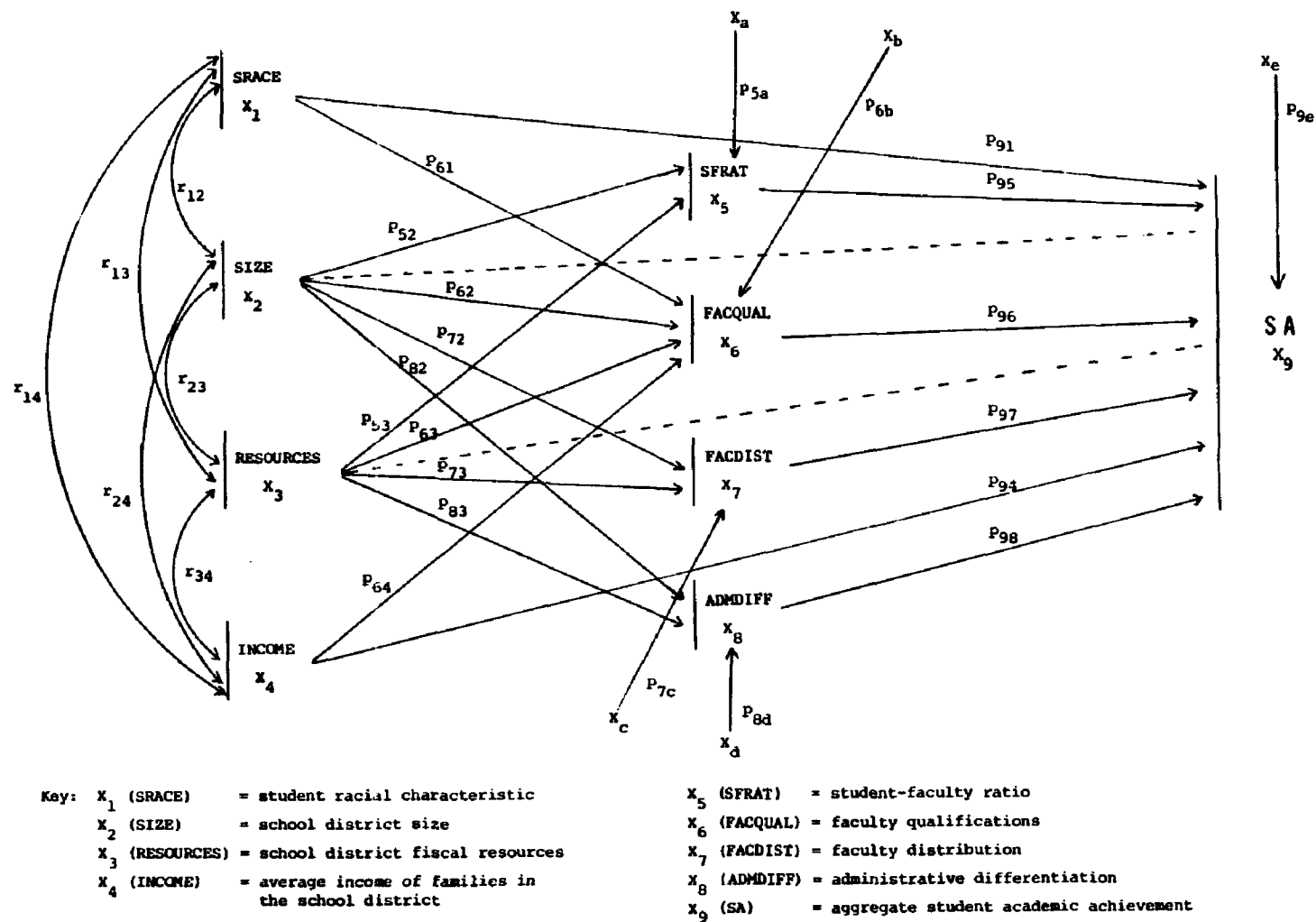


Figure 2.--The basic model of school district effectiveness.

$$x_5 = p_{52}x_2 + p_{53}x_3 + p_{5a}x_a$$

$$x_6 = p_{61}x_1 + p_{62}x_2 + p_{63}x_3 + p_{64}x_4 + p_{6b}x_b$$

$$x_7 = p_{72}x_2 + p_{73}x_3 + p_{7c}x_c$$

$$x_8 = p_{82}x_2 + p_{83}x_3 + p_{8d}x_d$$

$$x_9 = p_{91}x_1 + p_{94}x_4 + p_{95}x_5 + p_{96}x_6 + p_{97}x_7 + p_{98}x_8 + \\ p_{9e}x_e$$

Using this set of recursive equations, it is possible to estimate the path coefficients¹ for the hypothesized linkages through ordinary least squares, provided the previously stated assumptions that underlie the application of path analysis are met (Asher, 1976).

The evaluation of the causal process assumed to operate among the variables in the proposed model by decomposing the zero-order correlation coefficients into a sum of simple and compound paths follows the approach suggested by Alwin and Hauser (1975), who emphasized the need to distinguish between the concepts of total association and total effects. According to these authors, the total association between two variables is given by their zero-order correlation, which entails causal and noncausal components. The causal component of association is the

¹Since all variables in the model are expressed in standard form, the path coefficients become standardized regression coefficients obtained in the ordinary regression analysis.

total effect (direct effect, if any, plus indirect effect(s), if any) of one variable on another that is not due to non-causal components of association (i.e., neither due to their common causes, to correlation among their causes, nor to unanalyzed effects due to association of exogenous variables). Furthermore, the direct effect of one variable on another is part of the total effect, if any, that is not mediated by intervening variables. Conversely, the indirect effect of one variable on another is transmitted through intervening variables. As these authors observed, the distinction between direct and indirect effects as well as between causal and noncausal components of association refers to a specific model. In terms of total effect, for example, depending on the model postulated by the researcher, one variable may have only a direct effect on another, or only an indirect effect, or both effects.

The decomposition of the causal component of association between two variables (total effect) into direct and indirect elements is relatively simple to carry out. However, calculating the noncausal component of association between two variables may be tedious and cumbersome, depending on the number of variables and linkages indicated in a specific model. Fortunately, Alwin and Hauser (1975) provided a much simpler procedure: "The sum of the noncausal components of association may be found as the

difference between a total effect and the corresponding zero-order measure of association" (p. 42).

Since the simpler procedure for decomposing zero-order correlations between variables in the proposed causal system has been adopted in this investigation, the test of the model indicates whether the omitted linkages between variables that were hypothesized to have path coefficients equal or close to zero do, in fact, show path coefficients of zero magnitude.

The criteria for the deletion of path coefficients ("theory trimming")¹ are statistical significance and meaningfulness.² Path coefficients that are found to be significant at the .05 level and of magnitude greater than .05 will be retained; if they do not meet these criteria, they will be deleted.

The plan of analysis to be followed in the fourth chapter involves (1) theory trimming by estimating all the path coefficients in the recursive model through ordinary least squares (including the omitted linkages between variables that were hypothesized to have path coefficients equal or close to zero), using the criteria of statistical

¹The reader is referred to Heise (1969) and Kerlinger and Pedhazur (1973) for a discussion of this term.

²Land (1969) recommended that path coefficients lower than .05 can be regarded as not meaningful. This researcher followed Land's recommendation, treating path coefficients lower than .05 as not meaningful. This decision was made in view of the large number of cases ($n = 508$) used in the analysis.

significance (.05 level) and meaningfulness (coefficients lower than .05) for deletion of paths; and (2) decomposition of the total effect of independent variables on dependent variables in direct effect, if any, and indirect effects, if any, in order to obtain more information about the patterns of relationships between these variables.

Population and Data Collection¹

To test the recursive model presented in the foregoing sections, Michigan K-12 school district organizations were selected as the study population in view of their considerable variability with respect to the variables indicated in the model and their similarity "with respect to charter, goals, polity, technology and day-to-day activities" (Richardson, 1978, p. 73).

In the 1975-76 school year, there were 530 K-12 school districts in Michigan with a total enrollment of 2,124,221 elementary and secondary school students. The smallest school district enrolled only 113 students, and the largest enrolled 250,000 students. The typical school district provided educational services for 4,019 students.

¹For a detailed description of the study population and data-collection procedures, the reader is referred to Richardson (1978), who collected the data used in this research and provided the information for the description of the study population.

In addition, the size of the geographical areas served by these school districts ranged from approximately two square miles to over 1,200 square miles.

Considerable variation in the socioeconomic status of the community served by these school districts was also observed: the average income of the families in the typical school district was approximately \$11,000, with a range in income from a low of \$5,112 to a high of \$33,972. The amount of fiscal resources per pupil received by these school districts from local, state, and federal sources in order to meet basic expenses ranged from a low of \$729.91 to a high of \$2,279.50, with an average of approximately \$1,200 in the 1975-76 school year.

The variability of Michigan K-12 school districts with respect to the variables of interest in this study can be observed by examining Table 1. The summary measures displayed in Table 1 were computed from a data file of 508 school district organizations out of the existing 530 public K-12 school districts in Michigan during the 1975-76 school year. For 22 school districts, data concerning the variables included in this study were lacking because (1) information for two school districts was both incomplete and inaccurately recorded in one of the documentary sources and (2) the remaining 20 school districts did not have data for a critical variable--average income of the families in the school district.

Table 1.--Mean and standard deviation of variables indicated in the model.

Variable	Mean	Standard Deviation	n
Student racial characteristic	95.08	33.68	508
School district size (enrollment)	4125.69	12130.01	508
School district fiscal resources	1196.47	182.52	508
Average income of families in the school district	10914.21	2737.86	508
Student-faculty ratio	21.06	2.18	508
Faculty qualifications	31.34	13.05	508
Faculty distribution	.82	.04	508
Administrative differentiation	.29	.17	508
Aggregate student academic achievement	75.27	5.70	508

Richardson (1978) found no significant differences between the means of the two populations ($N = 528$ and $N = 508$) in a series of Z-tests. Further, multiple regression equations using both data sets ($N = 528$ and $N = 508$) "produced virtually identical results" (Richardson, 1978, p. 90).

Because the set of recursive equations (without X_4 = average income of the families in the school district) identified in the proposed model of school district effectiveness also yielded "virtually identical results" using both data sets ($N = 528$ and $N = 508$), it was decided to perform this investigation based on 508 school districts.

The data used in this study were obtained by Richardson (1978) from official documents and records.¹ The documentary information used in this investigation is straightforward, as can be observed in Appendix C. All of the data, with the exception of those obtained from the Executive Office of the Governor, are collected routinely by various divisions of the Michigan Department of Education and are recorded either in departmental publications or on magnetic tape. Some of these variables were merely transcribed since they were used as originally measured; measures for a few of them were created by manipulating the

¹A list of the sources of documentary information is furnished in Appendix C.

original information to obtain ratios, percentages, proportions, and so on.

Richardson (1978) verified the reliability of the data concerning several of the variables by cross-checking information that was duplicated in different documentary sources. Information derived from a survey instrument he administered enabled him to verify the reliability of information from documentary sources regarding the variable, administrative differentiation.

Variables

Although most of the variables¹ used in this study are straightforward and self-explanatory, some additional comments are provided here:

1. The measure for average income of the families in the school district was derived from 1970 Census data. Hence it reflects conditions at least five years before the conditions represented by the other variables indicated in the model. However, this source was the best available for such a variable at the time of the data collection.

2. In the review of related literature, it was observed that the two teacher characteristics most

¹In Appendix A, the operational definitions of the variables used in this study are provided. In Appendix B, the mean, standard deviation, and number of cases are listed for each variable.

frequently analyzed in school effects studies have been teachers' qualifications and teachers' experience. Since these two variables are highly correlated, this researcher decided to include only one of them in the model. Teachers' qualifications was selected over teachers' experience because of the possible nonlinear relationship between the latter variable and students' academic achievement (Spady, 1973).

3. Two indicators of the functional division of labor of school district organizations were available for use in this study: (a) faculty differentiation, which indicates the proportion of 81 teaching-assignment categories actually occupied as first or second assignments by district faculty members during the 1975-76 school year; and (b) faculty distribution, which indicates the extent of distribution of district faculty within occupied faculty-assignment categories¹ during the 1975-76 school year. Both variables measure the extent of faculty specialization: the former is a better indicator of specialization among teaching-assignment categories and also of breadth of curricular topics offered by school districts; the latter is a better indicator of specialization within teaching-assignment categories and also of depth of curricular

¹Reading, mathematics, and elementary education are examples of faculty-assignment categories, as stated earlier in this paper.

topics offered by school districts. In this study, faculty distribution was preferred over faculty differentiation because (a) faculty differentiation is highly correlated with administrative differentiation ($r = .84$), the selected indicator of the formal structure of authority relations in Michigan K-12 school districts; and (b) since faculty distribution is a better indicator of specialization within teaching-assignment categories (e.g., reading, mathematics) and also of depth of curricular topics offered by school districts, it would likely reveal a higher relationship with aggregate student academic achievement than would faculty differentiation--besides, the correlation between faculty distribution and administrative differentiation is low ($r = .29$).

4. Administrative differentiation was selected over other available indicators of hierarchy of authority and administrative apparatus because as an overall measure of the complexity of the administrative division of labor (it indicates the proportion of 24 administrative-assignment categories occupied as first or second assignments by district administrators during the 1975-76 school year) it provides a context for the consideration of both hierarchy of authority and administrative apparatus. Other available indicators of hierarchy of authority, besides being more specific (indicator of horizontal differentiation, indicator of vertical differentiation), are dependent on

the extent of administrative differentiation (see Richardson, 1978, pp. 124-42). Also, available indicators of administrative apparatus are very sensitive to measurement error since they express proportional relations between functions that are not necessarily mutually exclusive categories in every school district.

Summary

In this chapter, the causal recursive model of school district effectiveness was introduced. After an extended discussion of how the variables indicated in the model are assumed to relate to each other, the technique of path analysis was discussed since it is used to test the model in Chapter IV. A brief description of the study population was also provided, along with a discussion of data-collection procedures. Finally, some comments were made regarding measures selected for variables included in the model.

CHAPTER IV

EVALUATION OF THE BASIC MODEL

Introduction

In this chapter, the causal recursive model of school district effectiveness postulated in Chapter III is evaluated. For the sake of clarity, the hypothesized relationships between variables in the posited causal system are discussed in stages, each stage corresponding to the explanation of one endogenous variable in the model. In the last stage, in which the ultimate endogenous variable (aggregate student academic achievement) in the model is explained, the model as a whole is considered in the interpretation of results. It is in this stage that the goodness of fit of the whole model is discussed.

The presentation format followed in each stage involves: (1) presentation of a path diagram for a subsection of the model with all path coefficients estimated through the use of ordinary least squares; coefficients are provided not only for hypothesized linkages between variables but also for linkages that were omitted in the basic model since they are expected to have path coefficients equal or close to zero; (2) preliminary analysis of the path coefficients to assess if the hypothesized

linkages between variables are statistically significant and if the linkages that were omitted in the basic model do, in fact, show path coefficients that are not statistically significant; (3) presentation of a trimmed path diagram for the subsection of the model under consideration, with path coefficients resulting from regressing the variable to be explained for just those variables found to be significant in the previous diagram; and (4) interpretation¹ of the results of the final form of the subsection of the model.

In the last stage, in which the model as a whole is analyzed, the importance of all variables in the causal system supported by the data in explaining aggregate student academic achievement is considered. This is achieved by decomposing the total effects of the variables in the causal chain into direct and/or indirect effects on the ultimate dependent variable.

Tables for Figures 3 through 10 are presented in Appendix D. Those tables contain the following information: the standardized regression coefficient (β), the unstandardized regression coefficient (B), the standard error of the unstandardized regression coefficient (SE_B), the magnitude of the regression coefficient relative to the magnitude of its standard error, the coefficient of multiple correlation (R), the

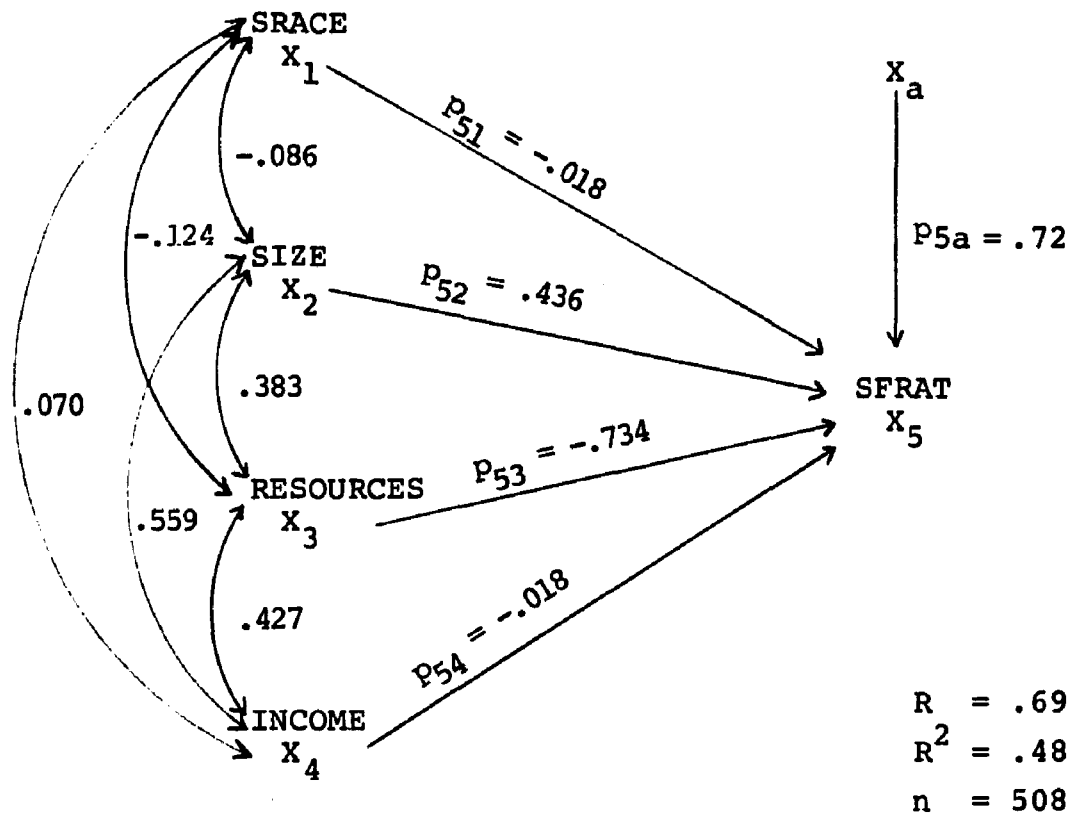
¹See Appendix F, where the criterion for the interpretation of the magnitude of the path coefficients (direct effect of one variable on another) is furnished.

coefficient of determination (R^2), and the number of cases (n). In Appendix E, the matrix of simple correlation is furnished.

The Explanation of Student-Faculty Ratio

What environmental input factors influence the ratio of students to faculty in Michigan K-12 school districts? In Chapter III, it was predicted that only two out of the four environmental input factors included in the model influence the ratio of students to faculty: school district fiscal resources (Hypothesis 5) and school district size (Hypothesis 13). School district fiscal resources was hypothesized to show a direct negative effect on student-faculty ratio, and school district size was hypothesized to show a direct positive effect on student-faculty ratio.

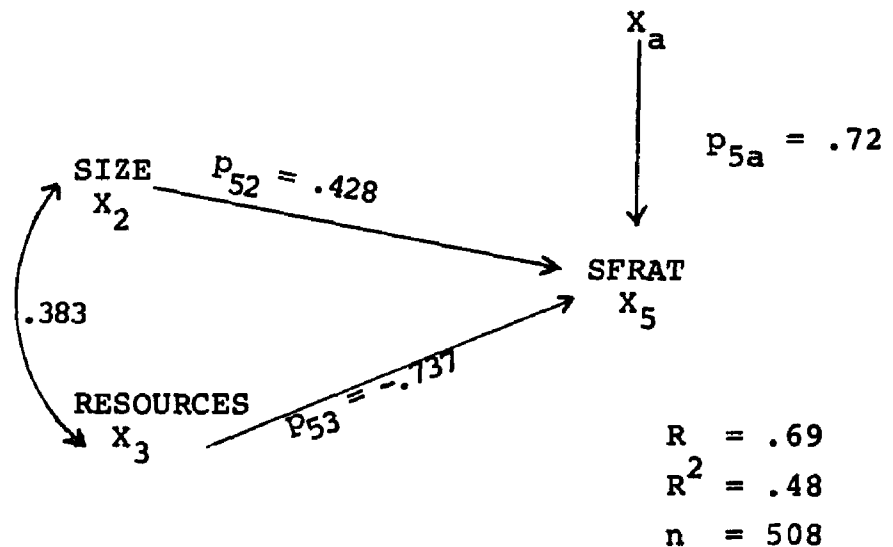
The result of regressing student-faculty ratio on all four environmental input factors is shown in Figure 3. As expected, the paths from student racial characteristic to student-faculty ratio ($p_{51} = -.018$) and from average income of the families in the school district to student-faculty ratio ($p_{54} = -.018$) do, in fact, show path coefficients close to zero. Dropping these two variables with not statistically significant coefficients, a final path diagram may be drawn for this subsection of the model, as shown in Figure 4. It can be seen that the diagram in



where: X₁ (SRACE) = Student racial characteristic
 X₂ (SIZE) = School district size (log)
 X₃ (RESOURCES) = School district fiscal resources
 X₄ (INCOME) = Average income of families in the school district
 X₅ (SFRAT) = Student-faculty ratio

Figure 3.--Path coefficients between environmental input factors and student-faculty ratio.

Figure 4 corresponds with the hypothesized linkages between variables for this subsection of the basic model represented in Figure 2. The path coefficients for the final form of this subsection of the model are based on regression with the variables found to be statistically significant in Figure 3, as predicted.



where: X_2 (SIZE) = School district size (log)
 X_3 (RESOURCES) = School district fiscal resources
 X_5 (SFRAT) = Student-faculty ratio

Figure 4.--Significant path coefficients between environmental input factors and student-faculty ratio.
 Recursive equation: $X_5 = p_{52}X_2 + p_{53}X_3 + p_{5a}X_a$.

It may be observed that there is no loss of information from Figure 3 to Figure 4, which includes only the environmental input factors that were hypothesized to

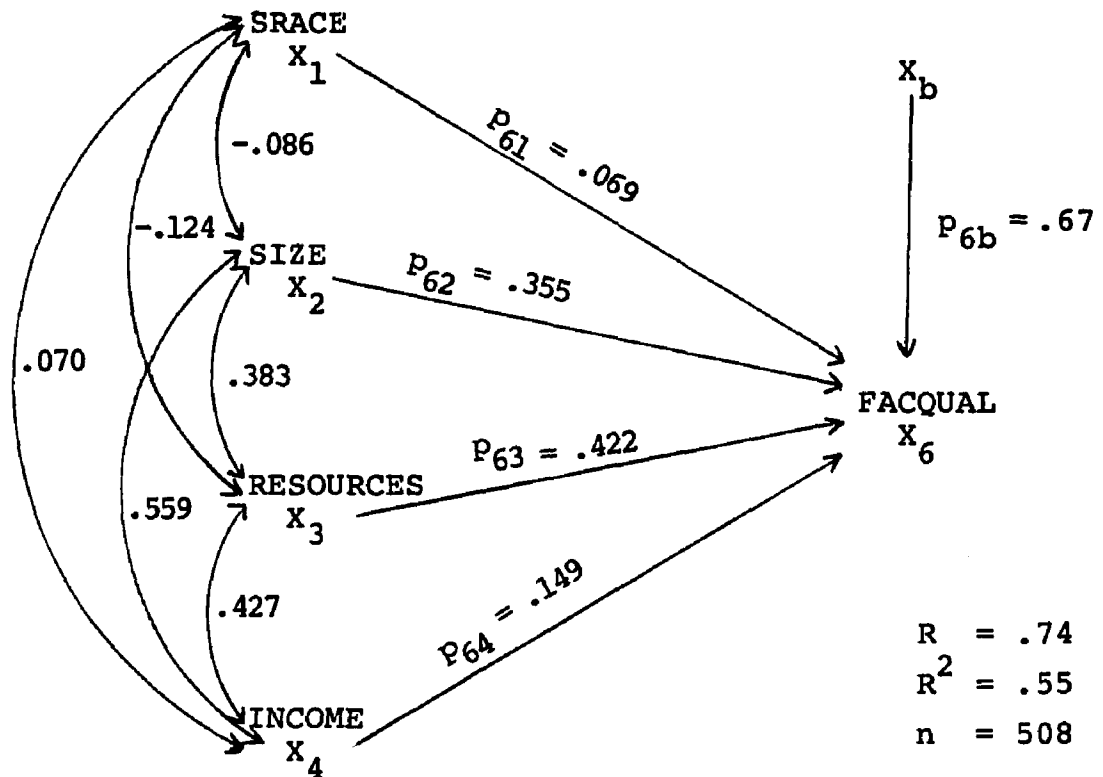
affect student-faculty ratio ($R = .69$; $R^2 = .48$). Hypotheses 5 and 13 are supported by the data: Both variables are significant predictors at the .01 level. School district size shows a moderately strong direct positive effect on student-faculty ratio ($p_{52} = .428$), which supports the prediction that increases in school district enrollment are followed by increases in the average number of students assigned to teachers. Conversely, school district fiscal resources has a strong direct negative effect on student-faculty ratio ($p_{53} = -.737$); the larger the amount of fiscal resources received by the school district, the smaller the average number of students per teacher. This finding demonstrates that school districts do conform to the prevailing institutional rule of the wider system--that by providing for a lower student-faculty ratio, the level of students' academic achievement will be improved. These findings also demonstrate that school districts with fewer fiscal resources are less able to lessen the impact of size than are wealthier school districts.

These two environmental input factors account for 48 percent ($R^2 = .48$) of the variance in student-faculty ratio, leaving 52 percent of the variance in this organizational attribute unexplained. The residual path coefficient equals .72 since the square root of the unexplained variation for student-faculty ratio is $p_{5a} = \sqrt{1-.48} = .72$.

The Explanation of Faculty Qualifications

In the preceding chapter, it was hypothesized that all four environmental input factors indicated in the model would affect the level of qualifications of faculty employed by the school districts: Hypotheses 6, 14, 18, and 21. All these factors (student racial characteristic, school district size, school district fiscal resources, and average income of the families in the school district) were hypothesized to have a direct positive effect on faculty qualifications.

In Figure 5, the result of regressing faculty qualifications on all four environmental input factors is represented. As predicted, all path coefficients in Figure 5 are statistically significant at the .05 level. All paths, except the path from student racial characteristic to faculty qualifications, were also statistically significant at the .01 level. The four environmental input factors explain 55 percent ($R^2 = .55$) of the variance in faculty qualifications. The unexplained variance in this organizational attribute is 45 percent. The path coefficient for the residual variable is .67. All four variables in Figure 5 are in accord with the hypothesized direction of the effects.



where: X_1 (SRACE) = Student racial characteristic
 X_2 (SIZE) = School district size (log)
 X_3 (RESOURCES) = School district fiscal resources
 X_4 (INCOME) = Average income of families in the school district
 X_6 (FACQUAL) = Faculty qualifications

Figure 5.--Significant path coefficients between environmental input factors and faculty qualifications. Recursive equation: $X_6 = P_{61}X_1 + P_{62}X_2 + P_{63}X_3 + P_{64}X_4 + P_{6b}X_b$.

The greatest contribution is given by school district fiscal resources, which shows a moderately strong positive impact on faculty qualifications ($p_{63} = .422$); the greater the amount of fiscal resources received by school districts, the greater the proportion of better-qualified faculty in the district. Also concerning this variable, the evidence is that school districts follow the institutionalized rule of the wider system--that expenditures on better-qualified faculty are worthwhile since they will provide better services, which will increase the level of students' academic achievement.

In terms of magnitude of influence, school district size ranks second among the environmental input factors, showing a moderate direct positive effect on faculty qualifications ($p_{62} = .355$). This finding supports the prediction that larger communities are more likely to attract better-qualified teachers than are smaller communities.

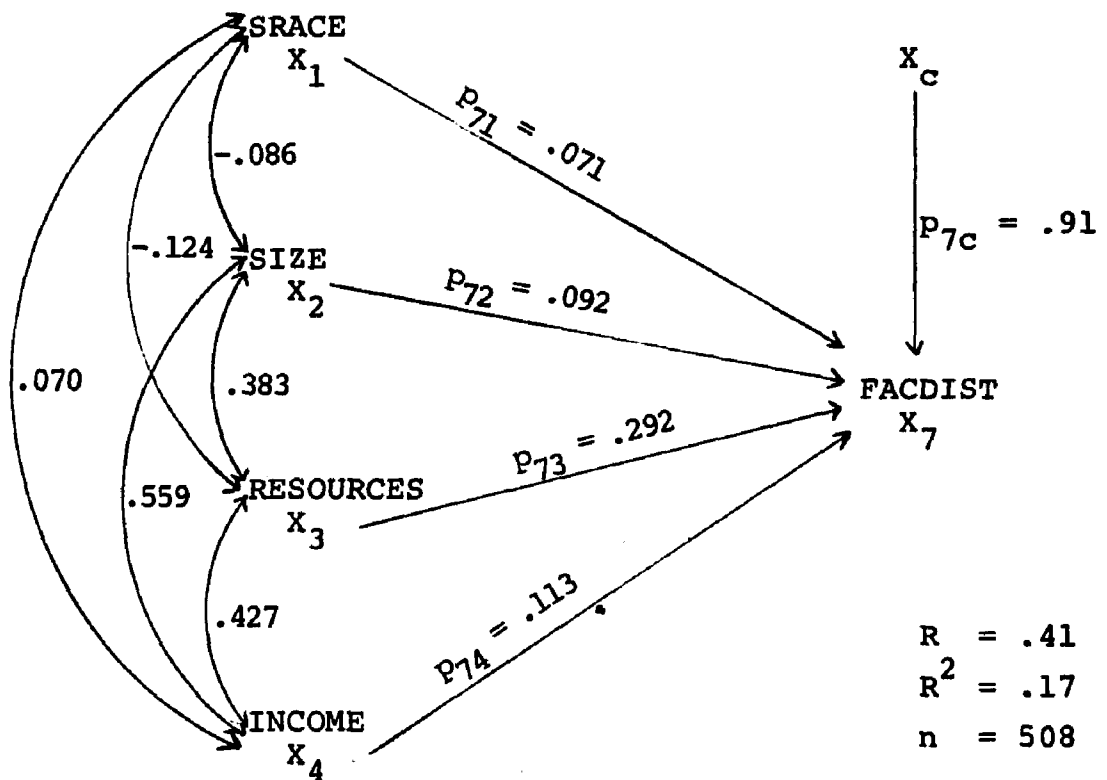
The small ($p_{64} = .149$) but statistically significant (.01 level) effect of average income of the families in the school district on faculty qualifications supports the prediction that the higher the socioeconomic level of the community, the higher the community's demand for better-qualified teachers. This prediction is also supported by the very small ($p_{61} = .069$) but statistically significant (.05 level) effect of student racial characteristic on faculty qualifications. The magnitude of

the latter path coefficient in comparison with the magnitude of the former supports the use of student racial characteristic as a proxy measure reflecting additional variance of socioeconomic status that is not represented in the single indicator, average income of the families in the school district.

The Explanation of Faculty Distribution

In the preceding chapter it was hypothesized that faculty distribution would be affected in a positive direction by two environmental input factors: school district size (Hypothesis 15) and school district fiscal resources (Hypothesis 7). It was expected that student racial characteristic and average income of the families in the school district would show no effect on faculty distribution.

The result of regressing faculty distribution on all four environmental input factors is shown in Figure 6. As expected, student racial characteristic, with a path coefficient of .071, do not influence faculty distribution at a statistically significant level. Also as predicted (Hypothesis 7), school district fiscal resources shows a direct positive effect on faculty distribution ($p_{73} = .292$), statistically significant at the .01 level, which demonstrates that diversification and depth of curricular topics are valued by school district organizations



where: X_1 (SRACE) = Student racial characteristic
 X_2 (SIZE) = School district size (log)
 X_3 (RESOURCES) = School district fiscal resources
 X_4 (INCOME) = Average income of families in the school district
 X_7 (FACDIST) = Faculty distribution

Figure 6.--Path coefficients between environmental input factors and faculty distribution.

since they direct a certain amount of fiscal resources to achieve a greater faculty distribution. Thus, the higher the amount of fiscal resources received by the school district, the higher the degree of faculty distribution.

However, contrary to the prediction made in this study, the path from school district size to faculty distribution, with a coefficient of .092, is not statistically significant at the .05 level. This coefficient is statistically significant at the .10 level, which does not meet the criterion adopted in this investigation. Also contrary to what was expected, average income of the families in the school district does show a direct positive impact on faculty distribution ($p_{74} = .113$) that is statistically significant at the .05 level.

These unexpected findings can be clarified through an analysis of the pattern of relationships between school district size, family average income, and faculty distribution. School district size and average income of the families in the school district show a moderate zero-order correlation coefficient ($r = .559$), which might mean that larger communities are likely to be of a higher socioeconomic level. Furthermore, it may be observed that these two variables vary simultaneously with faculty distribution, which show a simple correlation coefficient of .261 with school district size and of .294 with average income of the families in the school district.

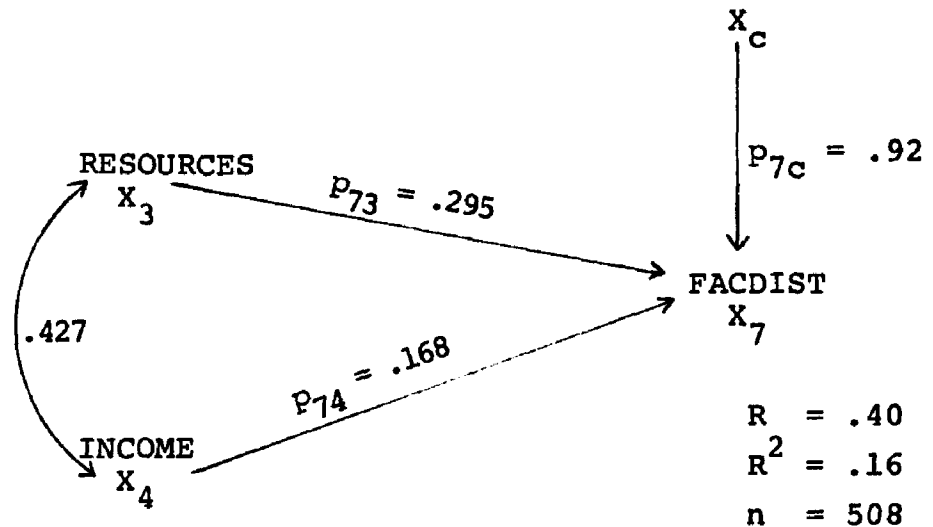
Given this pattern of zero-order correlations among these variables and given that in ordinary regression analysis the contribution of each variable in the equation is assessed after the contributions of all other variables in the equation have been considered, each path coefficient reflects the component of variation in faculty distribution attributable to a specific independent variable; i.e., the proportion of variance in faculty distribution that is due to the shared effect of school district size and family average income is reflected in the coefficient of determination (R^2) but is not attributable to either of these two variables individually. It follows that if family average income is taken out of the regression equation, school district size will increase in magnitude by the addition of the effect that it shares with family average income. In fact, taking out family average income from the regression equation, school district size shows a direct positive impact on faculty distribution ($p_{72} = .145$) that is statistically significant at the .01 level. Conversely, dropping school district size from the regression equation, average income of the families in the school district increases in magnitude ($p_{74} = .159$) as well as in statistical significance (from .05 to .01 level). In terms of percentage of variance accounted for in faculty distribution, the inclusion of either variable in the

regression equation produces virtually identical results ($R^2 = .16$).

Aside from the preceding methodological considerations, it would seem that the significant direct positive effect of average income of the families in the school district on faculty distribution results from the fact that families of higher socioeconomic status are more likely to require school districts to provide better education than are families of lower socioeconomic status. The evidence from this research demonstrates that families of higher socioeconomic status require in-depth preparation of their children, which provides for a greater specialization of functions within the instructional component of school district organizations. In synthesis, the greater the average income of families in the school district, the greater the specialization within teaching-assignment categories (e.g., reading, mathematics, elementary education) and also the greater the depth of curricular topics offered by school districts.

In view of the foregoing considerations, the two variables (student racial characteristic and school district size) with coefficients that are not statistically significant are dropped from this subsection of the model. The final path diagram for this subsection of the model is depicted in Figure 7. It may be observed that the loss of information from Figure 6 to Figure 7 is from $R = .41$ and

$R^2 = .17$ to $R = .40$ and $R^2 = .16$. Hypothesis 15 is not supported by the data; Hypothesis 7 is supported.



where: X_3 (RESOURCES) = School district fiscal resources
 X_4 (INCOME) = Average income of families in the school district
 X_7 (FACDIST) = Faculty distribution

Figure 7.--Significant path coefficients between environmental input factors and faculty distribution. Revised recursive equation:

$$X_7 = p_{73}X_3 + p_{74}X_4 + p_{7c}X_c.$$

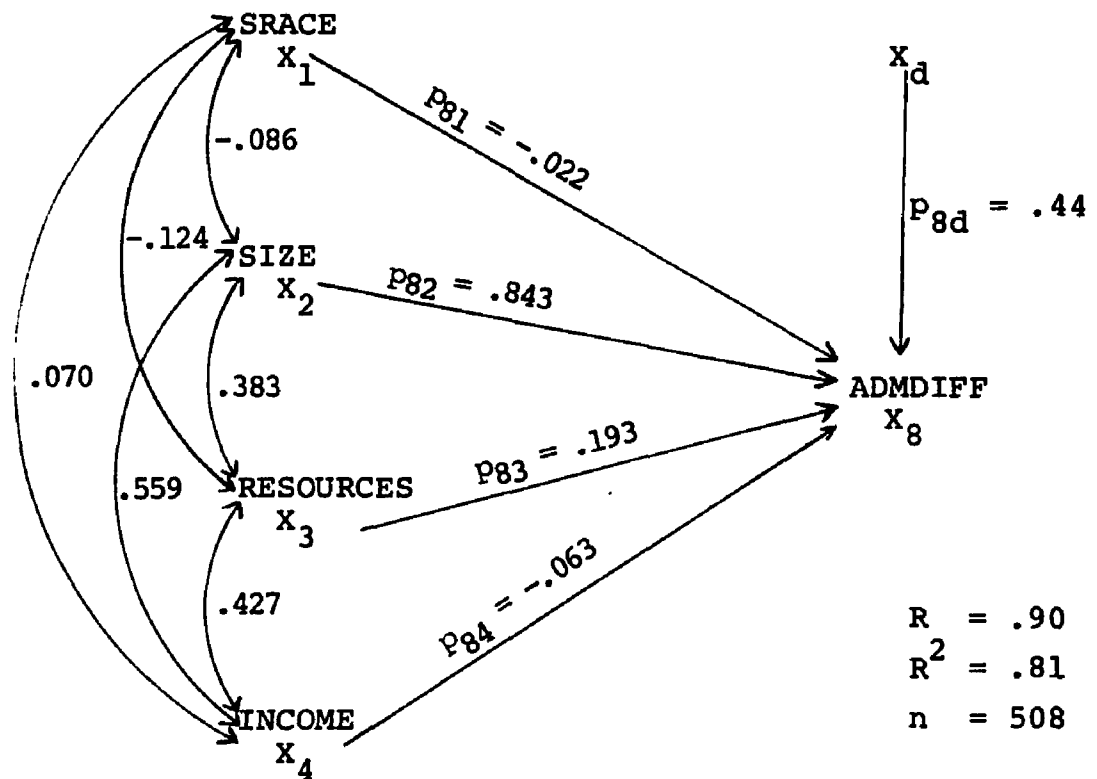
The two environmental input factors in Figure 7 account for 16 percent ($R^2 = .16$) of the variance in faculty distribution. The unexplained variance in this organizational attribute is 84 percent. The residual path coefficient for this endogenous variable equals .92. The difference in the magnitude of the path coefficients for the final form of this subsection of the model is a result

of regressing faculty distribution only on the two environmental input factors found to be statistically significant in Figure 6.

The Explanation of Administrative Differentiation

The fourth organizational attribute to be explained in this study is administrative differentiation. In Chapter III it was predicted that only two of the four environmental input factors included in the study affect administrative differentiation. Both school district size (Hypothesis 16) and school district fiscal resources (Hypothesis 8) were hypothesized to affect administrative differentiation in a positive direction; the latter was expected to show a small effect.

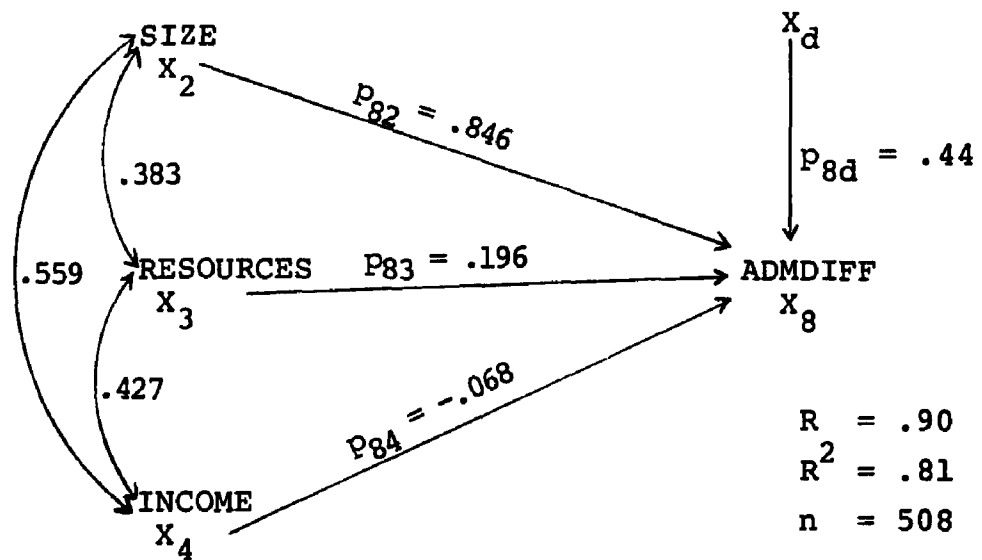
In Figure 8, the result of regressing administrative differentiation on all four environmental input factors is depicted. It may be observed in Figure 8 that the path from student racial characteristic to administrative differentiation ($p_{81} = -.022$) does in fact have a coefficient close to zero, as expected. However, the path from average income of the families in the school district to administrative differentiation, which was also hypothesized to be equal or close to zero, is statistically significant at the .05 level although the coefficient is very small ($p_{84} = -.063$). The other two environmental input factors are related to administrative differentiation,



where: X_1 (SRACE) = Student racial characteristic
 X_2 (SIZE) = School district size (log)
 X_3 (RESOURCES) = School district fiscal resources
 X_4 (INCOME) = Average income of families in the school district
 X_8 (ADMDIFF) = Administrative differentiation

Figure 8.--Path coefficients between environmental input factors and administrative differentiation.

as predicted. Dropping the variable with a coefficient that is not statistically significant, a final path diagram may be drawn for this subsection of the model, as shown in Figure 9.



where: X_2 (SIZE) = School district size (log)
 X_3 (RESOURCES) = School district fiscal resources
 X_4 (INCOME) = Average income of families in the school district
 X_8 (ADMDIFF) = Administrative differentiation

Figure 9.--Significant path coefficients between environmental input factors and administrative differentiation. Revised recursive equation:

$$X_8 = p_{82}X_2 + p_{83}X_3 + p_{84}X_4 + p_{8d}X_d.$$

It may be observed that except for the inclusion of the linkage between average income of the families in the school district and administrative differentiation, the diagram in Figure 9 corresponds with the

hypothesized linkages between variables for this subsection of the basic model depicted in Figure 2. The path coefficients for the final form of this subsection of the model resulted from regressing administrative differentiation only on the three environmental input factors found to be statistically significant in Figure 8.

It can be seen that there is no loss of information from Figure 8 to Figure 9 since $R = .90$ and $R^2 = .81$ in both figures. These three environmental input factors account for 81 percent ($R^2 = .81$) of the variance in administrative differentiation. The fraction of the unexplained variance in this organizational attribute is 19 percent. The path coefficient for the residual variable is .44.

Specifically in terms of each variable, it may be observed that school district size shows a very strong direct positive effect on administrative differentiation ($p_{82} = .846$), which is statistically significant at the .01 level. Thus, increases in student enrollment are followed by increases in the degree of functional division of managerial and administrative labor in school district organizations. This finding supports Hypothesis 16.

Also as predicted (Hypothesis 8), school district fiscal resources shows a small direct positive effect on administrative differentiation ($p_{83} = .196$). The result

is statistically significant at the .01 level. This finding supports the conception of educational organizations as being loosely coupled in terms of instructional activities and tightly controlled in terms of ritual classifications and categories. As was observed on page 75, the need for highly specialized administrative tasks in educational organizations is somewhat lowered since tight organizational control is only exercised over matters of categorization; as a consequence, school district organizations direct a small but significant amount of fiscal resources toward increasing administrative differentiation.

Finally, an influence that was not predicted in this study concerns the very small direct negative effect of average income of the families in the school district on administrative differentiation ($p_{84} = -.068$), which is statistically significant at the .05 level. The following may explain this finding: Poorer school districts frequently receive more fiscal resources from state and federal sources, which requires special administrative procedures; that is, there is the need to designate administrators to manage the special programs created with these funds, which provides for increased administrative differentiation.

The Explanation of Aggregate Student
Academic Achievement: Direct Effects

What environmental input factors and organizational attributes of school districts have a direct influence on students' aggregate levels of academic achievement in Michigan? In the preceding chapter, it was hypothesized that all four organizational attributes of school districts selected in this study would show a direct effect on aggregate student academic achievement: Two of them, student-faculty ratio (Hypothesis 23) and administrative differentiation (Hypothesis 26), would have a negative effect; the other two, faculty qualifications (Hypothesis 24) and faculty distribution (Hypothesis 25), would show a positive effect. Concerning the environmental input factors, student racial characteristic (Hypothesis 20) and average income of the families in the school district (Hypothesis 17) were hypothesized to have a direct positive effect on aggregate student academic achievement. For the two other environmental input factors (school district fiscal resources and school district size), no hypotheses of direct effect on aggregate student academic achievement were advanced since these two variables were regarded to affect aggregate student academic achievement primarily indirectly through their effects on intervening organizational variables. It was stressed, however, that this proposition would be supported only in the case of a fully

specified model, i.e., only when all significant intervening organizational variables between these two environmental input factors and aggregate student academic achievement were included in the model. If all of the significant intervening organizational variables between these two environmental input factors and aggregate student academic achievement were not included in the model, three alternative results are conceivable: no direct effect, a direct positive effect, or a direct negative effect of either of these two environmental input factors on aggregate student academic achievement. It was also pointed out that previous researchers have not indicated all the significant intervening organizational variables between these two environmental input factors and aggregate student academic achievement that are to be included in a model postulated within the framework of analysis adopted in this investigation. (See pages 68-70 and 76-77 of this study for a further explanation.)

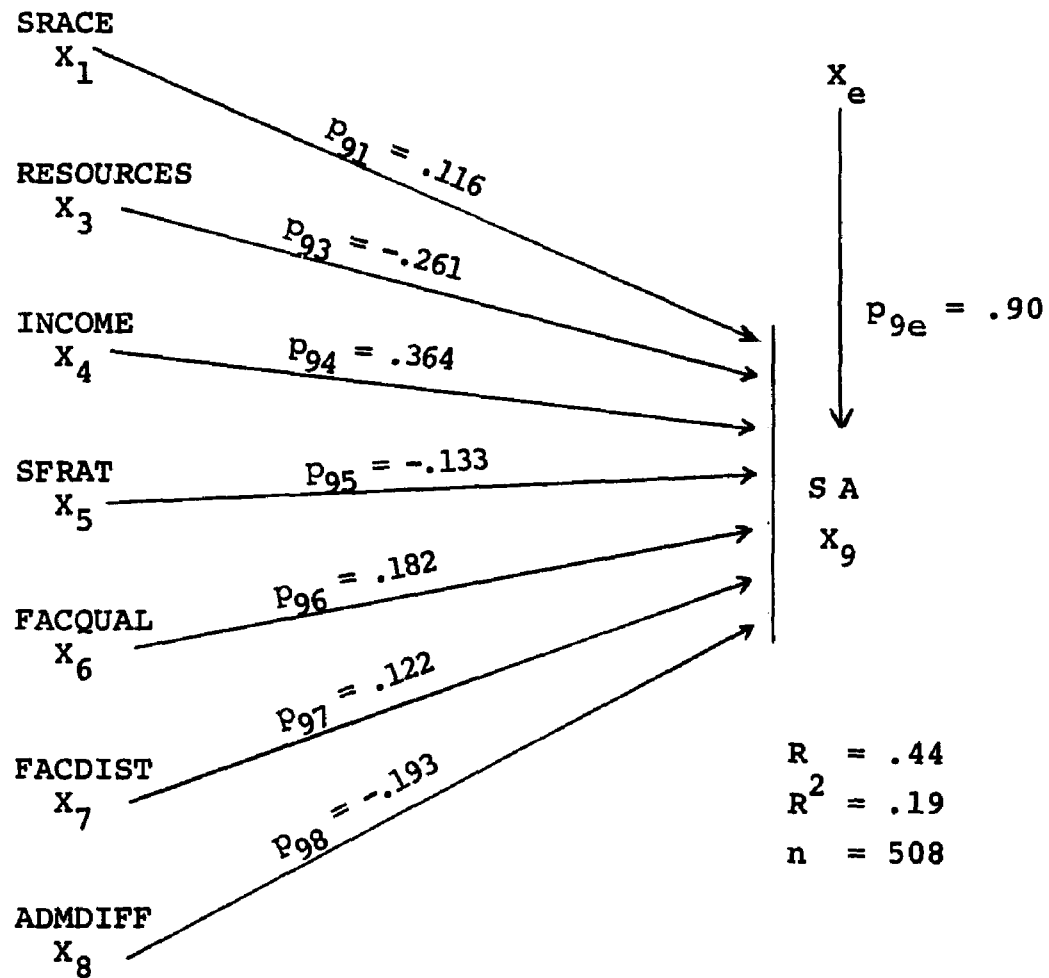
In view of the preceding considerations, the criterion variable, aggregate student academic achievement, was regressed not only on the six variables hypothesized to show a direct effect on it but also on these six variables plus school district fiscal resources and school district size. The result of this regression equation revealed a path coefficient close to zero ($-.025$) between school district size and aggregate student academic

achievement and a path coefficient of $-.262$ between school district fiscal resources and aggregate student academic achievement, which is statistically significant at the $.01$ level.

Do these results demonstrate that the model is fully specified concerning school district size and not fully specified concerning school district fiscal resources? Not necessarily with regard to school district size: It might mean that all significant intervening organizational variables that mediate the relationship between this variable and aggregate student academic achievement were included in the model (in which case the model would be fully specified concerning this variable), or it might mean that given the intercorrelations between school district size and other environmental input factors, the opposing indirect effects (positive and negative) of size on aggregate student academic achievement through intervening organizational attributes (see the final form of the whole model in Figure 11) might have balanced each other out. If the latter interpretation were correct, the inclusion of another intervening organizational variable in the model and/or the inclusion of another environmental input factor that would break the existing balance between positive and negative components would result in a direct effect of school district size on aggregate student academic achievement. With respect to school district

fiscal resources, the model is clearly not fully specified. In this case, the inclusion of another intervening organizational variable and/or the inclusion of another environmental input factor that would provide for the balancing out of positive and negative components would result in no direct effect of school district fiscal resources on aggregate student academic achievement. If this occurs, can one regard the model as being fully specified concerning this variable? Again, not necessarily. Continuous inclusion or deletion of intervening organizational attributes and/or environmental input factors in a model within this framework of analysis could keep changing the relationship between each of these two environmental factors (school district size and school district fiscal resources) and aggregate student academic achievement up to a point where the most important environmental input factors and intervening organizational attributes related to aggregate student academic achievement are identified. This can be achieved only through extensive research using the framework of analysis adopted in this study, aiming at increasing the explanatory and predictive power of further elaborated models.

Given that the path coefficient from school district size to aggregate student academic achievement is not statistically significant, the final form for this subsection of the basic model is represented in Figure 10. The



where: X_1 (SRACE) = Student racial characteristic
 X_3 (RESOURCES) = School district fiscal resources
 X_4 (INCOME) = Average income of families in the school district
 X_5 (SFRAT) = Student-faculty ratio
 X_6 (FACQUAL) = Faculty qualifications
 X_7 (FACDIST) = Faculty distribution
 X_8 (ADMDIFF) = Administrative differentiation
 X_9 (SA) = Aggregate student academic achievement

Figure 10.--Significant path coefficients between environmental input factors/organizational attributes and aggregate student academic achievement.
 Extended recursive equation: $X_9 = p_{91}X_1 + p_{93}X_3 + p_{94}X_4 + p_{95}X_5 + p_{96}X_6 + p_{97}X_7 + p_{98}X_8 + p_{9e}X_e$.

reported path coefficients result from regressing aggregate student academic achievement on all variables indicated in the model except for school district size.

All hypothesized linkages between variables for this subsection of the model are supported by the data. The coefficient of determination ($R^2 = .19$) shows that the four organizational attributes plus three out of the four environmental input factors explain 19 percent of the variance in aggregate student academic achievement. The path coefficient for the residual variable, which represents the square root of the unexplained variance, equals .90. The unexplained variance in aggregate student academic achievement is 81 percent.

Examining the contribution of each individual variable in the equation, it may be observed that average income of the families in the school district shows a moderate impact on the criterion variable, aggregate student academic achievement, with a path coefficient of .364, statistically significant at the .01 level. This result supports Hypothesis 17 and is in accordance with previous "school effects" investigations, in which researchers have found different indicators of socioeconomic status of students' families to be consistently related, in a positive direction, to students' academic achievement.

Another environmental input factor, student racial characteristic (percentage of Caucasian students

in the school district), shows a small direct positive effect on aggregate student academic achievement ($p_{91} = .116$), which is statistically significant at the .05 level. This result, which supports Hypothesis 20, is also in accordance with previous "school effects" research, which has pointed out that student racial characteristic is consistently related to students' academic achievement.

The other environmental input factors included in the model and found to have a moderately small direct effect on aggregate student academic achievement ($p_{93} = -.261$), statistically significant at the .01 level, is school district fiscal resources, which was discussed at the beginning of this section.

Among the organizational attributes indicated in the model, administrative differentiation shows a small direct negative influence on aggregate student academic achievement ($p_{98} = -.193$), statistically significant at the .01 level. This result supports Hypothesis 26, demonstrating that the higher the administrative differentiation within school district organizations, the lower the level of aggregate student academic achievement. That is, as administrators are more highly differentiated among more highly specialized positions and functions, their coordination and control over matters of categorization are greater than their contributions toward the instructional work of teachers. This, in effect, diverts teachers from their instructional

activities, consequently lowering the district's level of student academic achievement. It is pointed out that the administrative differentiation measure is made up of two components: academic administration, which is expected to be related positively to aggregate student academic achievement, and nonacademic administration, which is expected to be related negatively to aggregate student academic achievement. The fact that the path coefficient between administrative differentiation and the output, aggregate student academic achievement, is negative and of $-.193$ magnitude demonstrates that the influence of the nonacademic administration component on output in Michigan K-12 school districts must be greater since the observed path coefficient may be decreased in magnitude by the opposing influence of the academic administration component on output.

Another organizational attribute included in the model is faculty qualifications. As predicted (Hypothesis 24), this variable shows a direct positive influence on aggregate student academic achievement ($p_{96} = .182$), which is statistically significant at the $.01$ level. Thus, the higher the qualifications of teachers employed by the school district, the higher the district's level of student academic achievement. It may be observed that the size of the path coefficient is small.

A third organizational attribute used in this study is faculty distribution, which is a measure of the functional division of labor of school district organizations. The path coefficient between this variable and aggregate student academic achievement is small ($p_{97} = .122$) but statistically significant at the .05 level, revealing a direct positive effect of this organizational attribute. This result supports Hypothesis 25 and demonstrates that the greater the specialization of functions within the instructional component of school district organizations, the greater the district's level of student academic achievement.

Finally, with respect to student-faculty ratio, it can be observed in Figure 10 that this organizational attribute shows a small direct negative effect on aggregate student academic achievement ($p_{95} = -.133$), which is statistically significant at the .05 level. This result supports Hypothesis 23: The smaller the average number of students assigned to teachers, the higher the district's level of student academic achievement.

It may be observed in Figure 10 that the path coefficients between organizational attributes and aggregate student academic achievement are of small magnitude. It is stressed here, however, that aggregate student

academic achievement, the selected operative goal (output variable) of school district organizations, is an indicator of school district effectiveness at the elementary-school level since the only available measure of output was at this level. Given that academic achievement of students is likely to be emphasized more in higher grades than in lower ones, it seems reasonable to assume that the organizational attributes used in this study would show a stronger effect on aggregate student academic achievement measured at the secondary-school level. Support for this assumption was provided by Aldrich (1977), who demonstrated that as students move from lower to higher grade levels, the influence of school resources (organizational attributes) on their academic achievement increases and the influence of their background factors (family and/or community socioeconomic level) decreases.

The Basic Model Revised

In the foregoing explanation of each endogenous variable included in the basic model of school district effectiveness, the hypothesized linkages between variables were tested. Also, the omitted linkages between variables that were assumed to be not statistically significant were assessed through the use of a "theory trimming" approach.

With the exception of Hypothesis 15, all other hypotheses regarding the direct effect of one variable on another were supported by the data--all of them according to the predicted direction of influence. All but two of the omitted linkages were not statistically significant, as predicted. The two omitted linkages that were statistically significant concern the path from average income of the families in the school district to faculty distribution and the path from average income of the families in the school district to administrative differentiation.

The aggregation of the five subsections of the basic model evaluated and represented in their final form in the preceding pages results in the slightly revised model depicted in the path diagram in Figure 11 and expressed mathematically in the following set of recursive equations:

$$X_5 = p_{52}X_2 + p_{53}X_3 + p_{5a}X_a$$

$$X_6 = p_{61}X_1 + p_{62}X_2 + p_{63}X_3 + p_{64}X_4 + p_{6b}X_b$$

$$X_7 = p_{73}X_3 + p_{74}X_4 + p_{7c}X_c$$

$$X_8 = p_{82}X_2 + p_{83}X_3 + p_{84}X_4 + p_{8d}X_d$$

$$X_9 = p_{91}X_1 + p_{93}X_3 + p_{94}X_4 + p_{95}X_5 + p_{96}X_6 + \\ p_{97}X_7 + p_{98}X_8 + p_{9e}X_e$$

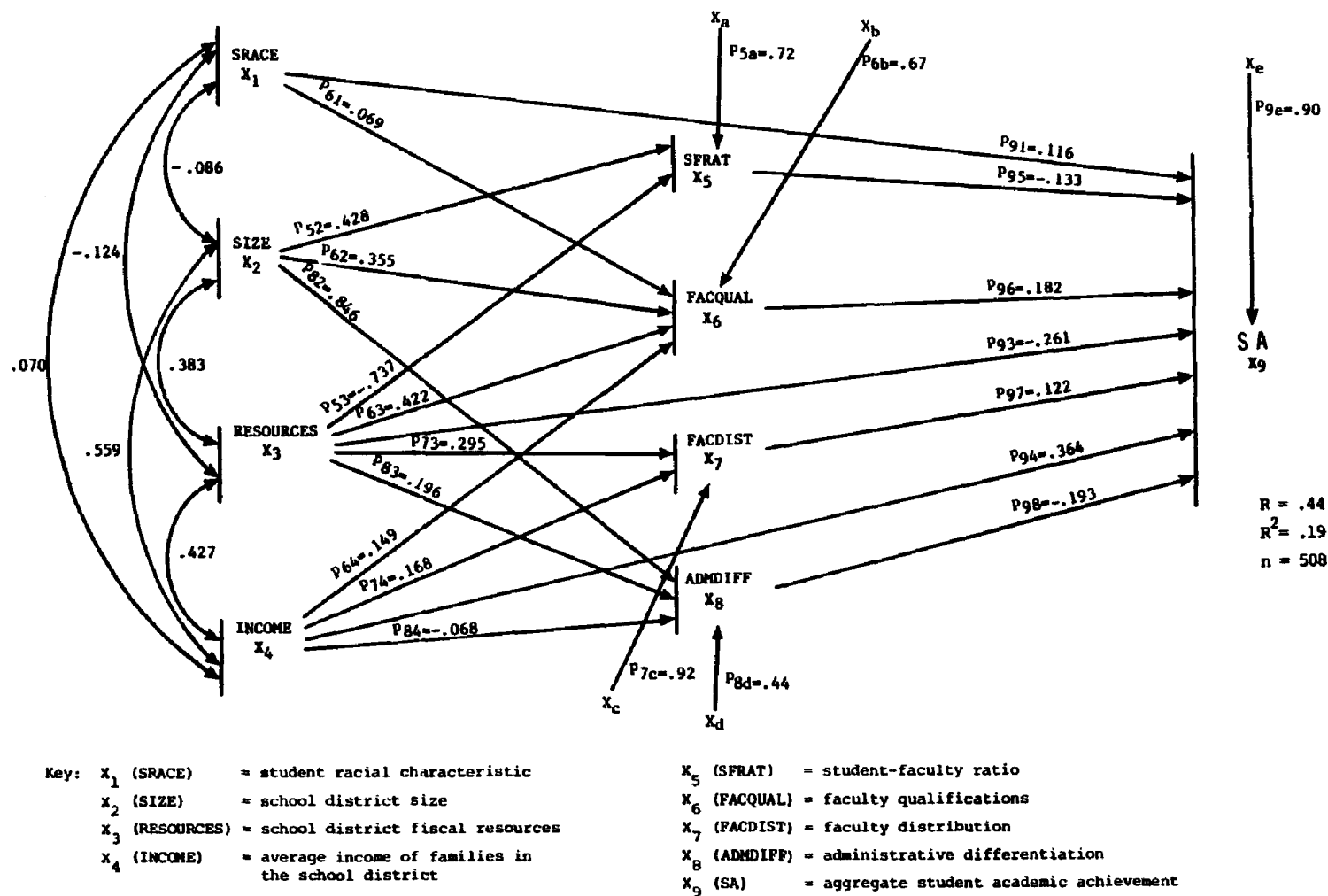


Figure 11.--The revised model of school district effectiveness.

The Explanation of Aggregate Student Academic
Achievement: Indirect Effects

In Chapter III, several hypotheses of indirect effects of environmental input factors on aggregate student academic achievement through intervening organizational attributes were stated. In view of the slight modification in the basic model, a question that logically follows is: Are the hypotheses of indirect effects stated in Chapter III supported in the revised model? The answer to this question is provided in Table 2, in which the indirect causal effects of environmental input factors on aggregate student academic achievement through intervening organizational variables are reported. The values presented in Table 2 were obtained by multiplying the path coefficients in the causal chain from the predetermined (exogenous) variables to the ultimate endogenous variable. For example, the multiplication of $p_{61} = .069$ by $p_{96} = .182$ in Figure 11 gives the indirect causal effect of student racial characteristic on aggregate student academic achievement through faculty qualifications, which equals .013. This result supports Hypothesis 22, which predicted an indirect positive effect of student racial characteristics on aggregate student academic achievement through the intervening organizational attribute, faculty qualifications. This suggests that the higher the percentage of Caucasian students in the school district, the better the

Table 2.--Decomposition of indirect causal effects of environmental input factors on aggregate student academic achievement through intervening organizational attributes.

Environmental Input Factors	Indirect Effects Via Organizational Attributes			
	Student-Faculty Ratio (SFRAT)	Faculty Qualifications (FACQUAL)	Faculty Distribution (FACDIST)	Administrative Differentiation (ADMDIFF)
Student racial characteristic (SRACE)	... ^a	.013	...	...
School district size (SIZE)	-.057	.065	...	-.163
School district fiscal resources (RESOURCES)	.098	.077	.036	-.038
Average income of the families in the school district (INCOME)	...	.027	.020	.013

^aThe symbol ... indicates that there is no indirect effect of the environmental input factor in question on aggregate student academic achievement through the organizational attribute under consideration.

level of qualification of the faculty employed by the school district and, as a consequence, the higher the district's level of student academic achievement.

Also, it is observed in Table 2 that all four hypotheses concerning indirect effects of school district fiscal resources on aggregate student academic achievement through intervening organizational attributes are supported in the revised model. The indirect positive effect (.098) through student-faculty ratio supports Hypothesis 1. This suggests that the more fiscal resources a school district receives, the lower is the average number of students assigned to teachers and, consequently, the higher is the district's level of student academic achievement. The indirect positive effect (.077) through faculty qualifications supports Hypothesis 2, which suggests that the greater the amount of fiscal resources received by a school district, the better the level of qualifications of the faculty employed by the school district and, thus, the higher the aggregate student academic achievement. The indirect positive effect (.036) through faculty distribution supports Hypothesis 3, which suggests that the more fiscal resources a school district receives, the greater the specialization of functions within the instructional component of the school district and the higher the district's level of student academic achievement. Finally, the indirect negative effect (-.038) through administrative

differentiation supports Hypothesis 4, which suggests that the greater the amount of fiscal resources received by a school district, the higher the degree of functional division of managerial and administrative labor in the school district and, thus, the lower the aggregate student academic achievement. The preceding causal chain of indirect effects of school district fiscal resources on aggregate student academic achievement through intervening organizational attributes is illustrated in Figure 12.

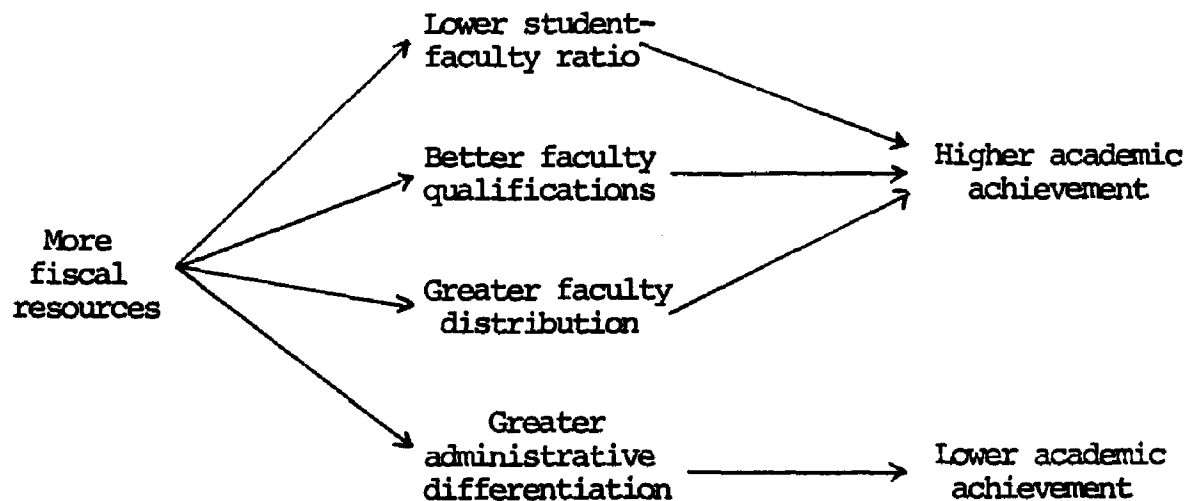


Figure 12.--Illustration of indirect effects of school district fiscal resources on aggregate student academic achievement through intervening organizational attributes.

With respect to the indirect effects of school district size on aggregate student academic achievement through intervening organizational attributes, it may be observed in Table 2 that three out of the four posited

hypotheses are supported in the revised model. The only hypothesis that is not supported is the one regarding the indirect effect of school district size on aggregate student academic achievement through faculty distribution (Hypothesis 11). This hypothesis is not supported since the path from school district size to faculty distribution was not included in the revised model, as discussed in a previous section entitled "The Explanation of Faculty Distribution." The indirect effects of school district size on aggregate student academic achievement supported in the revised model are as follows. The indirect negative effect ($-.057$) through student-faculty ratio supports Hypothesis 9, which suggests that the larger the size of a school district, the higher the average number of students assigned to teachers and, consequently, the lower the district's level of student academic achievement. The indirect positive effect ($.065$) through faculty qualifications supports Hypothesis 10; this suggests that the larger the size of a school district, the better the level of qualifications of the faculty employed by the school district and, hence, the higher the aggregate student academic achievement. Finally, the indirect negative effect ($-.163$) through administrative differentiation supports Hypothesis 12, which suggests that the larger the size of a school district, the higher the degree of functional division of managerial and administrative labor in the school district

and, as a consequence, the lower the district's level of student academic achievement. This causal chain of indirect effects of school district size on aggregate student academic achievement through intervening organizational attributes is illustrated in Figure 13.

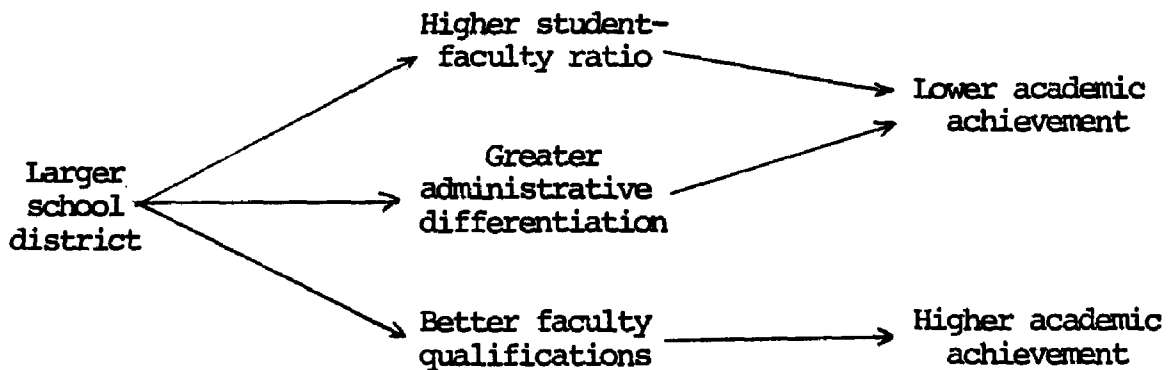


Figure 13.--Illustration of indirect effects of school district size on aggregate student academic achievement through intervening organizational attributes.

Finally, it may be observed in Table 2 that average income of the families in the school district shows an indirect positive effect (.027) on aggregate student academic achievement through faculty qualifications, which supports Hypothesis 19. This suggests that the higher the socioeconomic status of the families in a school district, the better the level of qualifications of the faculty employed by the school district and, consequently, the higher the district's level of student academic achievement. It may also be observed in Table 2 that two other indirect effects of average income of the families in the school

district on aggregate student academic achievement not hypothesized in the basic model are present in the revised model depicted in Figure 11. These two additional indirect effects result from the inclusion of two new linkages in the revised model: the path from family average income to faculty distribution and the path from family average income to administrative differentiation. The indirect effect (.020) of family average income on aggregate student academic achievement through faculty distribution is positive, which suggests that the higher the socioeconomic status of the families in a school district, the greater the specialization of functions within the instructional component of the school district and, thus, the higher the district's level of student academic achievement. The indirect effect (.013) of family average income on aggregate student academic achievement through administrative differentiation is also positive, which suggests that the higher the socioeconomic status of the families in a school district, the lower the degree of functional division of managerial and administrative labor in the school district and, as a consequence, the higher the district's level of student academic achievement. The causal chain of indirect effects of average income of the families in the school district on aggregate student academic achievement through intervening organizational attributes is illustrated in Figure 14.

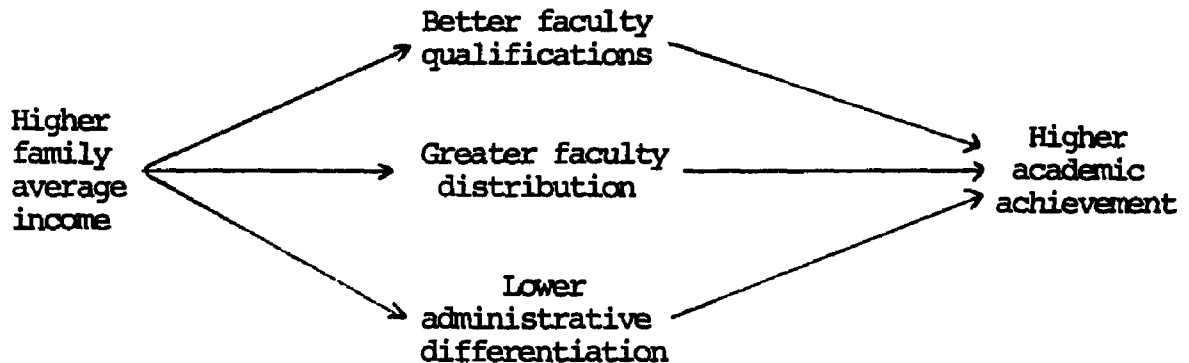


Figure 14.--Illustration of indirect effects of average income of the families in the school district on aggregate student academic achievement through intervening organizational attributes.

The preceding analysis of indirect effects of environmental input factors on aggregate student academic achievement through intervening organizational attributes suggests that the framework of analysis used in this study is adequate. All but one of ten hypotheses of indirect effects were supported by the data. In addition, two indirect effects of family socioeconomic status on aggregate student academic achievement were revealed (as illustrated in Figure 14) that were not predicted in the basic model represented in Figure 2.

The indirect effects of school district size and school district fiscal resources are revealing, since the inspection of the simple correlation coefficient between these variables and the output, aggregate student academic achievement, respectively .039 and .018, could lead one to

conclude that these two environmental input factors have no effect on output when, in fact, they do have indirect effects in opposing directions on the output through intervening organizational attributes, as illustrated in Figures 12 and 13.

Concluding Remarks

Based on the analysis throughout this chapter, it is suggested that the posited causal recursive model of school district effectiveness is adequate. Twenty-four out of the 26 hypotheses postulated in this investigation were supported by the data. Only Hypotheses 11 and 15 were not supported. Furthermore, the inclusion of two linkages between variables in the revised model that were omitted in the basic model provided further support for the framework of analysis adopted for use in this study.

The goodness of fit of the posited causal system, which was evaluated by stages throughout this chapter, can be observed by comparing the basic model represented in Figure 2 with the revised model represented in Figure 11 and summarized in Table 3 for the sake of clarity.

The goodness of fit of the linkages between variables postulated in the basic model of school district effectiveness met the investigator's expectations. The results supported the contention that attributes of school district organizations do mediate to some degree the relationships

Table 3.--Decomposition of the total effect of environmental input factors on organizational attributes and of environmental input factors and organizational attributes on aggregate student academic achievement.

Dependent Variable	Independent Variable	Direct Effect	Indirect Effect Via:				Total Effect
			SFRAT	FACQUAL	FACDIST	ADMDIFF	
SFRAT	SIZE	.428	...	...	...	...	.428
	RESOURCES	-.737	...	...	...	...	-.737
FACQUAL	SRACE	.069	...	...	...	...	.069
	SIZE	.355	...	...	...	...	.355
	RESOURCES	.422	...	...	...	...	.422
	INCOME	.149	...	...	...	...	.149
FACDIST	RESOURCES	.295	...	...	...	...	.295
	INCOME	.168	...	...	...	...	.168
ADMDIFF	SIZE	.846	...	...	...	...	.846
	RESOURCES	.196	...	...	...	...	.196
	INCOME	-.068	...	...	...	...	-.068
S A	SRACE	.116	...	.013	...	...	.129
	SIZE	...	-.057	.065	...	-.163	-.155
	RESOURCES	-.261	.098	.077	.036	-.038	-.088
	INCOME	.364	...	.027	.020	.013	.424
	SFRAT	-.133	...	...	...	...	-.133
	FACQUAL	.182	...	...	...	...	.182
	FACDIST	.122	...	...	...	...	.122
	ADMDIFF	-.193	...	...	...	...	-.193

Note: Data obtained from Figure 11.

between environmental input factors and aggregate student academic achievement.

What about the postulated model's explanatory power? A discussion of this aspect is provided in Chapter V. A descriptive summary of the results concerning this aspect is provided below.

The environmental input factors included in the model accounted for 48 percent ($R^2 = .48$) of the variance in student-faculty ratio; the unexplained variance in this organizational attribute was 52 percent. With regard to the variance in faculty qualifications, the environmental input factors explained 55 percent ($R^2 = .55$) and left 45 percent unexplained. These explanatory variables accounted for 16 percent ($R^2 = .16$) of the variance in faculty distribution, leaving 84 percent unexplained. In terms of the variance in administrative differentiation, the environmental input factors explained 81 percent ($R^2 = .81$) and left 19 percent unexplained. Finally, with respect to the variance in aggregate student academic achievement, environmental input factors and organizational attributes explained 19 percent ($R^2 = .19$); 81 percent of the variance in this variable was left unexplained.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Overview

The main question¹ that the researcher sought to answer in this investigation was: To what extent do school district organizational attributes mediate the relationships between environmental input factors and the district's level of student academic achievement? In setting forth this question, the investigator assumed that organizational attributes do mediate, to some degree, the relationships between inputs from the organization's environment and the organization's output. This investigator interpreted the failure of input-output researchers to produce consistent findings regarding the importance of school resources in influencing students' academic achievement (see Chapter II) as resulting from the fact that they have not taken into account the characteristics of educational organizations. In other words, input-output researchers have not analyzed the issue of "school effects" from an organizational-effectiveness perspective.

¹The researcher raised this question on the basis of the framework of analysis for studying school district effectiveness suggested by Bidwell and Kasarda (1975).

To set forth and to answer the posited question, the investigator adopted an organizational-effectiveness perspective: the combined approach for studying the effectiveness of organizations, in general, and of educational organizations, in particular. Using this approach, the researcher formulated and tested a causal recursive model of school district effectiveness that included four environmental input factors, four school district organizational attributes, and the selected operative goal of schooling (criterion or output variable), students' academic achievement aggregated at the school district level. The study population selected for testing the proposed model was Michigan K-12 school district organizations. The technique used for testing the model, which encompassed 26 hypotheses, was path analysis. The causal process assumed to operate among the variables in the model was evaluated in stages, following a "theory trimming" approach. By using this approach, the investigator was able to test the hypothesized linkages between variables and also the omitted linkages between variables that were assumed to be not statistically significant at the established criterion level of .05. (See Chapter III.)¹

¹Since no case necessitated the use of the meaningfulness criterion (path coefficients lower than .05 but statistically significant at the .05 level), this criterion was not referred to in Chapter IV and is not mentioned in this chapter.

Summary and Discussion

The relationships between environmental input factors and school district organizational attributes were mostly as anticipated in the model. Also, the relationships between aggregate student academic achievement and both sets of variables, environmental input factors and organizational attributes, were predominantly as anticipated in the model. A summary of the findings concerning the relationships between these variables is presented in the following pages, along with a discussion of the power of the variables taken as causes in explaining the variance of the variable taken as effect. In discussing the explanatory power of the model concerning each endogenous variable, the statistic used is the coefficient of determination¹ (R^2), which indicates the percentage of variation in the dependent variable accounted for by the independent variables in the regression equation.

With respect to student-faculty ratio, two environmental input factors (student racial characteristic and average income of the families in the school district) were found to be not related to this organizational attribute at a statistically significant level, as expected. The other two environmental input factors (school district size and school district fiscal resources) showed a statistically

¹See Appendix G, where the criterion for the interpretation of the magnitude of the coefficient of determination is furnished.

significant influence on this organizational attribute, as predicted. School district fiscal resources showed a direct negative effect on student-faculty ratio; the larger the amount of fiscal resources received by the school district, the smaller the average number of students per teacher. School district size showed a direct positive influence on student-faculty ratio; as enrollment increases, the average number of students per teacher increases. These two environmental input factors explained 48 percent of the variance in student-faculty ratio, leaving 52 percent of the total variance unexplained. Consequently, the researcher considered the explanatory power of the model concerning this variable to be marked.

These findings are very similar to those reported by Bidwell and Kasarda (1975) in their study of school districts in the state of Colorado.

In regard to faculty qualifications, all four environmental input factors had a statistically significant effect on this organizational attribute, as predicted. School district fiscal resources showed a direct positive influence on faculty qualifications; the greater the amount of fiscal resources received by a school district, the larger the proportion of better-qualified faculty in the district. School district size showed a direct positive effect on faculty qualifications; larger communities are more likely to attract better-qualified teachers than are

smaller communities. Finally, average income of the families in the school district and student racial characteristic showed a direct positive impact on faculty qualifications; the higher the socioeconomic status of the community, the higher the community's demand for better-qualified teachers. These four environmental input factors explained 55 percent of the variance in faculty qualifications, leaving unexplained 45 percent of the variance. The investigator considers the explanatory power of the model concerning this organizational attribute to be marked.

Except for student racial characteristic, these findings are similar to those reported by Bidwell and Kasarda (1975) in their study of school districts in Colorado. These scholars used different indicators of socioeconomic status and also utilized percentage of nonwhite in the community instead of percentage of Caucasian students in the school district (student racial characteristic).

The third endogenous variable analyzed in the preceding chapter was faculty distribution. As anticipated, student racial characteristic was found to be not related to this organizational attribute at a statistically significant level. Also as predicted, school district fiscal resources showed a statistically significant direct positive effect on faculty distribution; the greater the amount of fiscal resources received by the school district, the higher the degree of faculty distribution. Contrary to

expectation, school district size was found to be not related to faculty distribution at a statistically significant level. Also contrary to what was anticipated, average income of the families in the school district showed a statistically significant direct positive influence on this organizational attribute; the higher the socioeconomic level of the community, the higher the degree of faculty distribution.

The two environmental input factors that were shown to be related to faculty distribution at a statistically significant level accounted for 16 percent of the variation in this organizational attribute, leaving 84 percent of the variance unexplained. As a consequence, the researcher considers the explanatory power of the model concerning this variable to be low.

The finding of no significant relationship between school district size and faculty distribution contradicts what has been reported by organizational researchers: the consistent positive relationship between size and the complexity of an organization's division of labor regardless of the indicators used to measure either variable. The finding of significant positive relationship between school district fiscal resources and faculty distribution is similar to the one reported by Richardson (1978) in his analysis of the structural characteristics of school district organizations in Michigan. To the extent of this

investigator's knowledge, organizational researchers have not examined the relationships between the other two environmental input factors and faculty distribution, prior to this study.

With respect to administrative differentiation, student racial characteristic was found to be not related to this organizational attribute at a statistically significant level, as anticipated. Also as predicted, school district size showed a statistically significant direct positive effect on administrative differentiation; increases in student enrollment are followed by increases in the degree of functional division of managerial and administrative labor in school district organizations. Another prediction that was supported concerns the statistically significant direct positive effect of school district fiscal resources on administrative differentiation. Finally and contrary to what was anticipated, average income of the families in the school district showed a statistically significant direct negative influence on administrative differentiation; it would seem that poorer school districts receive more fiscal resources from state and federal sources, which requires increased administrative differentiation.

These three environmental input factors explained 81 percent of the variance in administrative differentiation, leaving 19 percent of the variance unexplained. The

investigator considers the explanatory power of the model concerning this organizational attribute to be high.

The statistically significant relationship between school district size and administrative differentiation is in accord with the findings reported by organizational researchers. To the extent of this investigator's knowledge, organizational researchers have not examined the relationships between the other three environmental input factors and administrative differentiation, prior to this study.

Finally, aggregate student academic achievement was found to be related to all four organizational attributes and to all but one of four environmental input factors at a statistically significant level. The only variable found to be not directly related to aggregate student academic achievement at a statistically significant level was school district size. The three environmental input factors found to be significantly related to the output, aggregate student academic achievement, are: school district fiscal resources, which showed a direct negative effect on the output; student racial characteristic (percentage Caucasian students), which showed a direct positive effect on the output; and average income of the families in the school district, which showed a direct positive effect on the output. Concerning organizational attributes: student-faculty

ratio showed a direct negative effect on the output; faculty qualifications showed a direct positive influence on the output; faculty distribution had a direct positive impact on the output; and, finally, administrative differentiation showed a direct negative effect on the output.

Environmental input factors and organizational attributes accounted for 19 percent of the variation in aggregate student academic achievement, leaving 81 percent unexplained variance. Consequently, the explanatory power of the model concerning the effectiveness criterion variable is regarded as moderate by the investigator.

At this point, it is observed that all but one of 16 hypotheses of direct effect of one variable on another were supported by the data. Also, as anticipated, all but two of the omitted linkages were not statistically significant.

With respect to indirect effects of environmental input factors on aggregate student academic achievement through intervening organizational attributes, the following summary is provided: All but one of ten hypotheses of indirect effects were supported by the data. In addition, two indirect effects of the environmental input factor, average income of the families in the school district, that were not predicted in the basic model were included in the revised model. These indirect effects are not reported in this summary because they can be understood more easily by

examining Tables 2 or 3 and Figures 12, 13, and 14 in Chapter IV.

Given the goodness of fit of the postulated linkages between variables in the model, this investigator now returns to the question regarding its explanatory power. In an earlier section of the summary, it was observed that the explanatory power of the model was marked regarding student-faculty ratio and faculty qualifications; it was high concerning administrative differentiation; it was low regarding faculty distribution; and it was moderate concerning aggregate student academic achievement.

The low explanatory power of the model regarding faculty distribution and the moderate explanatory power of the model concerning aggregate student academic achievement is somewhat disappointing in view of the overall goodness of fit of the linkages between variables in the model. Pedhazur (1975) pointed out several possible reasons for obtaining small or moderate coefficients of determination; it seems that at least two of them are applicable to this investigation.

A possible explanation for the small coefficient of determination (R^2) regarding faculty distribution has to do with its relatively low variability. It may be observed that faculty distribution has a very small variance (.0016); i.e., there is not too much to be explained since school districts in Michigan are nearly alike in

terms of faculty distribution. If this interpretation is correct, as it seems likely to be, the small coefficient of determination ($R^2 = .16$) concerning this organizational attribute would be explained.

A possible explanation for obtaining the moderate coefficient of determination ($R^2 = .19$) for aggregate student academic achievement is that "an insufficient number of independent variables is included in the study"

(Pedhazur, 1975, p. 245). It may be observed that in relation to this dependent variable, several other independent variables could be included in the model; for example: measures of student ability and motivation, measures of professional support staff (e.g., guidance counselors, social workers), measures of academic and non-academic administration, and so on.

The preceding considerations might give the impression that the explanatory power of the model is the only issue in causal analysis. It is observed, however, that the fraction of explained variance in a given dependent variable is one issue in the context of causal modeling. As Heise (1969) pointed out,

The potential for refining or trimming a theory, and thus making the theory more parsimonious, clearly is of considerable significance and could be listed along with the issues of explanation and simulation as a basic gain to be acquired from the construction of linear models (pp. 59-60).

Conclusions and Recommendations

Even though the explanatory power of the model concerning aggregate student academic achievement (criterion variable) was regarded as moderate by this investigator, it may be pointed out that the posited model shows a coefficient of determination for this variable that is equivalent to most of the coefficients of determination shown in the input-output studies reviewed in Chapter II (see Averch et al., 1972). Furthermore, it seems that the chain of relationships in the supported causal system did provide a "meaningful" explanation of the 19 percent of variance in aggregate student academic achievement as compared with input-output studies, in which "the investigator is relegated to the role of guessing or playing his hunches about what variables play an important role in the creation of some definition of educational output" (New York State Education Department, 1972, p. 10).

The "meaningful" explanation of the 19 percent of variance in aggregate student academic achievement results from the theoretical nature of this investigation as compared with the atheoretical nature of input-output studies. (See page 52.) That is, instead of attempting to verify the extent to which output variations are explained by input variations (the basic research problem in the input-output approach), this investigator attempted to use a

theory¹ of the academic production process of educational organizations. The basic elements considered in the proposed theory of the academic production process of educational organizations were organizational components (structure, technology, and operative goal) and environmental factors. The fundamental assumption was that any attempt to specify a theory of production for education must take into account how these basic elements relate to each other. Based on the combined approach for studying organizational effectiveness and the conceptualization of educational organizations as bureaucracies that are loosely coupled in terms of instructional activities and tightly controlled in terms of ritual classifications and categories, this researcher proposed that school district organizational attributes (structure) may mediate, to some degree, the relationships between environmental input factors and the selected operative goal, aggregate student academic achievement. This proposition was set forth on the basis of the argument (pages 20-24) that environmental factors are the major determinants of the structure of school district organizations since in educational organizations structure and technology (instructional activities) are loosely coupled in view of the uncertainty and ambiguity

¹This "theory" was developed on the basis of the work of several authors (see Chapters I-III), in particular the article by Bidwell and Kasarda (1975).

that surround the technology of instruction. That is, the structure of educational organizations is not derived from the coordinative requirements of instruction; instead, it is determined by environmental factors. This accounts for the highly institutionalized form of educational organizations within the societal context and for their tight control over matters of categorization, which legitimizes and gives meaning to their internal processes, justifying their existence to society. Thus, environmental factors affect the structure of school district organizations, which, in turn, constrains and facilitates instructional activities and consequently inhibits and facilitates students' academic achievement. The institutionalized structure of school district organizations facilitates aggregate student academic achievement through certain attributes (e.g., faculty distribution) that enhance the instructional process; conversely, it constrains aggregate student academic achievement through certain attributes (e.g., administrative differentiation) that inhibit the instructional process.

It seems to this investigator that the theoretical framework summarized above does provide a "meaningful" explanation of the academic production process of school district organizations. The analysis of Michigan K-12 school districts reported in Chapter IV and summarized in the preceding section provided evidence to support the

proposed theory of the academic production process of school district organizations.

Overall, the results supported the contention that attributes of school district organizations do mediate to some degree the relationships between environmental input factors and aggregate student academic achievement. This contention was especially supported in regard to school district size and school district fiscal resources, as anticipated.

With respect to size, it is worth noting its importance to the morphology of school district organizations in Michigan, despite the fact that it was found to be not related to faculty distribution at a statistically significant level. Except for the result concerning faculty distribution, the findings regarding the influence of size on organizational structure are in accord with most studies of organizational structure in which size has been found to be the primary determinant of organizational form. Further, it is worth noting the opposing indirect effects of size on the output, aggregate student academic achievement, through intervening organizational attributes. Although size showed no direct effect on output, its opposing indirect effects through intervening organizational attributes suggest its problematic nature, which creates a dilemma for administrators and policy makers: What would be the optimal size of school districts, given the opposing

indirect effects of size on the output, aggregate student academic achievement? Further, what kinds of changes in the structure of school district organizations are necessary, given growth or decline in student enrollment, to make optimal use of resources in the face of opposing indirect effects of size on output? Research addressing questions such as these is suggested in view of the outcomes of this study regarding school district size. Such research could provide important information for policy-makers and practicing administrators.

The effects of school district fiscal resources on the structure of school district organizations are also worth mentioning. This environmental input factor affected all four organizational attributes included in the investigation. It also showed indirect effects on the output, aggregate student academic achievement, through all four intervening organizational attributes and a direct negative effect on output resulting from the fact that the supported causal model is not fully specified regarding this variable and output. The findings concerning the direct and indirect influence of school district fiscal resources on aggregate student academic achievement contradict what several input-output researchers have reported: that variation in the amount of fiscal resources received by the school district has little to do with variation in students' academic achievement. The evidence from

this investigation suggests that this conclusion reflects the failure of input-output researchers to consider the intervening nature of school district organizational attributes. Given the implications of this investigator's findings for educational practice, further research is advised before any attempt is made to formulate policy recommendations. It is suggested that future investigations include other school district organizational attributes that might mediate the relationship between fiscal resources and output. Further, it is suggested that the two components of administrative differentiation (academic administration and nonacademic administration) be separated into two specific indicators since the magnitude of the indirect negative effect of fiscal resources on output through this intervening organizational attribute might be decreased by the opposing direction of influence of both measures.

The direction of effects of school district organizational attributes on aggregate student academic achievement (negative direct effect: student-faculty ratio and administrative differentiation; positive direct effect: faculty qualifications and faculty distribution) seems to provide support to: (1) the conception of educational organizations as being loosely coupled in terms of instructional activities and tightly controlled in terms of ritual classifications and categories; and (2) the consequent

argument regarding the classification of school district organizational attributes in two groups: task-facilitating and task-inhibiting attributes.

Furthermore, the findings regarding the direct effect of all school district organizational attributes but administrative differentiation on the output, aggregate student academic achievement, support the commonly accepted position that the technology of instruction is labor intensive, requiring persisting interaction between each individual teacher and his students: The direct negative effect of student-faculty ratio on output suggests that the greater the teacher's span of control, the less adaptive to specific performances and characteristics his/her response to students is likely to be, which decreases their academic achievement; the direct positive effect of faculty qualifications on output suggests that the teacher-intensive character of instruction requires improved teaching skills (assumed to be related to higher levels of college training), which increases students' academic achievement; finally, the direct positive effect of faculty distribution on output suggests that given the labor-intensive character of instruction, more specialized teachers can provide better services to students in such crucial areas as reading and mathematics than can less specialized teachers, which increases students' academic achievement. These findings also seem to provide support

for the centrality of teachers to effective school district academic performance. As a consequence, it seems reasonable to recommend that school district administrators avoid engaging in activities that might divert teachers from their instructional work if, as assumed in this study, improvement of students' academic achievement is regarded as an important operative goal of school district organizations. Further, there is a need for extensive research on the technology of instruction to decrease the uncertainty and vagueness concerning the link between instructional work (technical means) and students' academic achievement (operative end). As Bidwell (1979) pointed out, "to address problems of school productivity or of change in school organization, we first must be precise and analytical about the technology of teaching" (p. 114).

It seems to this investigator that one of the most important outcomes of this study is the anticipated finding of a direct negative effect of administrative differentiation on the output, aggregate student academic achievement. This finding is regarded as important because it supports the notion that educational organizations are loosely coupled in terms of instructional activities and tightly controlled in terms of ritual classifications and categories (pages 23-24 and 88-89). Further, because the administrative differentiation measure is made up of two components that are expected to have opposing effects on

output (academic administration, positive effect; nonacademic administration, negative effect), its negative effect on output constitutes an underestimation of the negative effect of nonacademic administration on output. As a consequence, it is suggested that future studies of the effectiveness of school district organizations use the two components of administrative differentiation, academic administration and nonacademic administration, as separate organizational attributes in order to evaluate the effect of each on the output, aggregate student academic achievement. If, in future investigations, academic administration is consistently found to be related positively to output and nonacademic administration is consistently found to be related negatively to output, changes in the administrative configuration of school district organizations may be recommended. Recommendations regarding the administrative configuration of school district organizations will more likely be concerned with the issue of optimal school district size, given the very strong positive effect of size on administrative differentiation and given the negative indirect effect of size on aggregate student academic achievement through administrative differentiation.

The preceding material suggests the adequacy of using the combined approach for studying the effectiveness of school district organizations. Although, as in

input-output studies, community socioeconomic status is the greatest contributor to the explanatory power of the causal model in regard to the output, aggregate student academic achievement, organizational attributes are also statistically significant determinants of output. Further, organizational attributes of school districts do mediate, to some degree, the relationships between environmental input factors and aggregate student academic achievement.

The results of this investigation are similar to the findings reported by Bidwell and Kasarda (1975) in their study of the effectiveness of school district organizations in Colorado, using a framework of analysis that is basically in line with the combined approach for studying organizational effectiveness used in this research. Although the findings of this investigation are not generalizable beyond Michigan K-12 school districts, their similarity to the findings reported for Bidwell and Kasarda's study suggests the adequacy of the theoretical framework used in this investigation and raises the possibility of obtaining similar results in different areas of the country. However, a word of caution is necessary: Because of the newness of the approach and the implications of the findings for educational policy and practice, it is not only advisable but highly necessary that further work be done to revalidate and reaffirm the results before any changes within the school system can be recommended.

The need for caution is especially advised given two limitations of this study: (1) The absence of direct reliable measures of student ability and motivation. To circumvent this problem, proxy measures of these factors were used. However, the use of proxy measures may be regarded as problematic even at the aggregate level. As Erickson (1977) pointed out, "research proxies often obscure more than they reveal, failing to approximate what they are assumed to approximate" (p. 120). (2) The operative goal of school district organizations, aggregate student academic achievement, was measured only at the elementary-school level because of the nonexistence of a standardized measure of students' academic achievement for the study population of interest at the secondary-school level. Thus, the reported findings reflect school district effectiveness at the elementary-school level.

At this point, it may be worth pointing out that both environmental input factors and organizational attributes were selected for inclusion in the model because of their likelihood of being related to the criterion variable, aggregate student academic achievement. That is, the selection of variables to be used in this study was directed by the investigator's fundamental concern with a theory of the academic production process of school district organizations. However, school districts are multi-purpose organizations; i.e., they are also concerned with

other operative goals (products) such as "health care, food service, or pupil transportation" (Bidwell, 1979, p. 117). Consequently, certain organizational attributes that were not included in this investigation, given the selected criterion variable, would need to be taken into consideration if another operative goal of school district organizations besides aggregate student academic achievement were used as a criterion variable. Further, it is possible to find certain organizational attributes that affect one criterion variable and do not affect another, and it is also possible that certain organizational attributes that affect one criterion variable positively may affect another negatively.

The purpose of introducing such considerations in this study is to call the reader's attention to the limitations of any study in which a single criterion variable is used to assess the effectiveness of most organizational types. That is, even if repeated investigations in different areas of the country confirm the findings reported in this dissertation, caution is still necessary before any changes within the school system are recommended, since it is possible that modifications intended to increase the degree of attainment of one operative goal might decrease the degree of attainment of other operative goals.

In light of these considerations, it is suggested that future investigators be concerned with an overall

theory of production of school district organizations instead of being concerned only with a theory of the academic production process of school district organizations. Therefore, it is recommended that further research be designed to include different operative goals of school district organizations as criterion variables, such as: measures of aggregate student academic achievement at both the elementary- and secondary-school levels. Within academic achievement itself, the use of multiple-subject-area measures is suggested. Besides academic achievement, the use of measures of other operative goals of school district organizations is advised. It is further recommended that the combined approach for studying organizational effectiveness be used, because in this investigation as well as in the study conducted by Bidwell and Kasarda (1975) the adequacy of such an approach was confirmed.

It seems to this investigator that the adequacy of the combined approach for studying the effectiveness of organizations is not restricted to educational-type organizations but includes other types of organizations as well. The writer anticipates that future investigators will confirm the usefulness of such an approach for studying the effectiveness of organizations in a variety of organizational settings, thus providing support for this assertion.

Conclusions: Summary

The major conclusions from this investigation are summarized as follows:

1. Contrary to the frequently held position that schooling makes no difference in students' academic achievement, it was found that at the school district level of analysis, organizational attributes do affect aggregate student academic achievement; yet, this influence is small.

2. School district size has a relevant influence on the structure of school districts in Michigan; its effect is particularly strong on the functional division of managerial and administrative labor of school district organizations. Size also shows indirect effects on aggregate student academic achievement through student-faculty ratio, faculty qualifications, and administrative differentiation; the opposing direction of these indirect effects suggests the difficulties to be faced by policy makers and practicing administrators in regard to the issue of optimal school district size: On the one hand, increases in size result in gains in aggregate student academic achievement through increases in the level of qualifications of faculty employed by the school district; on the other hand, increases in size result in losses in aggregate student academic achievement through higher student-faculty ratio and greater administrative differentiation.

3. The amount of fiscal resources available for school districts to operate affects aggregate student academic achievement through its influence on the structure of school districts. The evidence from this study supports past and continuous efforts to equalize the revenues of school districts with the objective of increasing educational parity.

4. As in input-output studies, the indicator of socioeconomic status (family average income) is the greatest contributor to the explanatory power of the model in regard to aggregate student academic achievement.

5. Finally, the findings from this investigation seem to provide support to (a) the proposition that attributes of school district organizations do mediate, to some degree, the relationships between environmental input factors and aggregate student academic achievement; (b) the conception of educational organizations as being loosely coupled in terms of instructional activities and tightly controlled in terms of ritual classifications and categories; and (c) the commonly accepted position that the technology of instruction is labor intensive, requiring persisting interaction between each individual teacher and his students; this suggests the centrality of the role of teachers to effective school district performance.

APPENDICES

APPENDIX A

OPERATIONAL DEFINITION OF VARIABLES

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OPERATIONAL DEFINITION OF VARIABLES

Environmental Input Factors

X_1 = Student racial characteristic (SRACE) = The percentage of K-12 students in the district classified as Caucasian as of the close of school on the fourth Friday following Labor Day (September 26), 1975.

X_2 = School district size (SIZE) = The total number of K-12 students legally enrolled in the district at the close of school on the fourth Friday following Labor Day (September 26), 1975.

Observation: A few very large school districts provided for a skewed distribution of this variable (see Table 1). In order to correct for the skewed distribution, this variable was transformed via logarithms (\log_{10}). This procedure was followed to meet the assumption of linear relationships among the variables indicated in the model which underlies the application of path analysis.

X_3 = School district fiscal resources (RESOURCES) = The sum of all local, state, and federal revenue received by the school district, divided by size.

X_4 = Average income of the families in the school district (INCOME) = The average income of the families in the district as reported in the U.S. Census of 1970.

School District Organizational Attributes

X_5 = Student-faculty ratio (SFRAT) = Size divided by the total number of faculty employed by the school district during the 1975-76 school year.

X_6 = Faculty qualifications (FACQUAL) = The percentage of school district faculty holding a masters, doctors, or specialist degree during the 1975-76 school year.

X_7 = Faculty distribution (FACDIST) = The distribution of school district faculty within occupied faculty-assignment categories (e.g., reading, mathematics, elementary education) during the 1975-76 school year. That is:

$1 - [\Sigma X^2 / (\Sigma X)^2]$, where X = the number of faculty in each of 81 faculty-assignment categories.

X_8 = Administrative differentiation (ADMDIFF) = The proportion of 24 administrative-assignment categories occupied by district administrators during the 1975-76 school year.

School District Operative Goal
(Criterion or Output Variable)

X_9 = Aggregate student academic achievement (SA) = The average number of reading and math objectives answered correctly by district fourth and seventh graders on the Michigan Assessment Test in 1975-76.

APPENDIX B

MEAN AND STANDARD DEVIATION OF VARIABLES

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MEAN AND STANDARD DEVIATION OF VARIABLES

Variable		Mean	Standard Deviation	n
(SRACE)	= Student racial characteristic	95.08	33.68	508
(SIZE)	= School district size (log)	3.365	.403	508
(RESOURCES)	= School district fiscal resources	1196.47	182.52	508
(INCOME)	= Average income of families in the school district	10914.21	2737.86	508
(SFRAT)	= Student-faculty ratio	21.06	2.18	508
(FACQUAL)	= Faculty qualifications	31.34	13.05	508
(FACDIST)	= Faculty distribution	.82	.04	508
(ADMDIFF)	= Administrative differentiation	.29	.17	508
(SA)	= Aggregate student academic achievement	75.27	5.70	508

APPENDIX C

DATA SOURCES

APPENDIX C

DATA SOURCES

Source	Variable
"All District Data" (Magnetic Tape), Office of the Governor, Lansing, Michigan, 1976.	INCOME
"Ranking of Michigan Public High School Districts by Selected Financial Data" (Bulletin 1012), Michigan Department of Education, Lansing, Michigan, 1976.	SIZE RESOURCES SFRAT
"School Racial-Ethnic Census" (Printout), Michigan Department of Education, Office of Equal Education Opportunity, Lansing, Michigan, 1976.	SRACE
"1975-1976 Register of Professional Personnel" (Magnetic Tape), Michigan Department of Education, Teacher Preparation and Professional Development Services Section, 1976.	SFRAT FACQUAL FACDIST ADMDIFF
"Administrative Configuration Survey," Robert H. Richardson, Michigan State University, 1978.	ADMDIFF
"Michigan Education Assessment Program" (Magnetic Tape), Michigan Department of Education, Research, Evaluation and Assessment Services, Lansing, Michigan, 1976.	SA

Source: Robert H. Richardson, "A Comparative Analysis of the Structural Characteristics of School Organizations" (Ph.D. dissertation, Michigan State University, 1978), pp. 231-40.

APPENDIX D

**TABLES FOR FIGURES 3 THROUGH 10
PRESENTED IN CHAPTER IV**

APPENDIX D

TABLES FOR FIGURES 3 THROUGH 10 PRESENTED IN CHAPTER IV

The tables presented in this appendix contain the following information: (1) the standardized partial regression coefficient, β , which indicates the direct effect of the independent upon the dependent variable in standard score form; (2) the unstandardized regression coefficient, B , which indicates the direct effect of the independent on the dependent variable in the metric of the respective independent and dependent variables; (3) the standard error of the unstandardized regression coefficient, SE_B , which is used to determine the statistical significance of the relationship between the independent and the dependent variable; (4) the coefficient of multiple correlation, R ; (5) the coefficient of determination, R^2 , which indicates the percentage of the total variance of the dependent variable accounted for by the independent variables in the regression equation; (6) the number of cases, n , from which the statistics were calculated; and (7) the magnitude of the regression coefficient relative to the magnitude of its standard error, * or **.

TABLE FOR FIGURE 3

Ordinary Regression of SFRAT on SRACE, SIZE (log), RESOURCES, and INCOME

Variable		Beta	B	SE _B
SRACE	= Student racial characteristic	-.018	-.0012	.0021
SIZE	= School district size (log)	.436**	2.35	.213
RESOURCES	= School district fiscal resources	-.734**	-.0087	.00043
INCOME	= Average income of the families in the school district	-.018	-.000014	.000032

**Coefficient is more than three times its standard error.

R = .69

 $R^2 = .48$

n = 508

TABLE FOR FIGURE 4

Ordinary Regression of SFRAT on SIZE (log) and RESOURCES

Variable		Beta	B	SE _B
SIZE	= School district size (log)	.428**	2.31	.186
RESOURCES	= School district fiscal resources	-.737**	-.0088	.00041

**Coefficient is more than three times its standard error.

R = .69

 R^2 = .48

n = 508

TABLE FOR FIGURE 5

Ordinary Regression of FACQUAL on SRACE, SIZE (log), RESOURCES, and INCOME

Variable		Beta	B	SE _B
SRACE	= Student racial characteristic	.069*	.0266	.0119
SIZE	= School district size (log)	.355**	11.47	1.20
RESOURCES	= School district fiscal resources	.422**	.0302	.0024
INCOME	= Average income of the families in the school district	.149**	.00071	.00018

*Coefficient is twice its standard error.

**Coefficient is more than three times its standard error.

R = .74

R² = .55

n = 508

TABLE FOR FIGURE 6

Ordinary Regression of FACDIST on SRACE, SIZE (log), RESOURCES, and INCOME

Variable		Beta	B	SE _B
SRACE	= Student racial characteristic	.071	.000076	.000044
SIZE	= School district size (log)	.092	.0082	.0045
RESOURCES	= School district fiscal resources	.292**	.000057	.0000091
INCOME	= Average income of the families in the school district	.113*	.0000015	.00000068

*Coefficient is twice its standard error.

**Coefficient is more than three times its standard error.

R = .41

 $R^2 = .17$

n = 508

TABLE FOR FIGURE 7

Ordinary Regression of FACDIST on RESOURCES and INCOME

Variable		Beta	B	SE _B
RESOURCES	= School district fiscal resources	.295**	.000058	.0000088
INCOME	= Average income of the families in the school district	.168**	.0000022	.00000059

**Coefficient is more than three times its standard error.

R = .40

 R^2 = .16

n = 508

TABLE FOR FIGURE 8

Ordinary Regression of ADMDIFF on SRACE, SIZE (log), RESOURCES, and INCOME

Variable		Beta	B	SE _B
SRACE	= Student racial characteristic	-.022	-.00011	.00010
SIZE	= School district size (log)	.843**	.363	.010
RESOURCES	= School district fiscal resources	.193**	.00018	.000021
INCOME	= Average income of the families in the school district	-.063*	-.0000040	.0000016

*Coefficient is twice its standard error.

**Coefficient is more than three times its standard error.

R = .90

R² = .81

n = 508

TABLE FOR FIGURE 9

Ordinary Regression of ADMDIFF on SIZE (log), RESOURCES, and INCOME

Variable		Beta	B	SE _B
SIZE	= School district size (log)	.846**	.364	.010
RESOURCES	= School district fiscal resources	.196**	.00019	.000021
INCOME	= Average income of the families in the school district	-.068*	-.0000043	.0000015

*Coefficient is twice its standard error.

**Coefficient is more than three times its standard error.

R = .90

 $R^2 = .81$

n = 508

TABLE FOR FIGURE 10

Ordinary Regression of SA on SRACE, RESOURCES, INCOME, SFRAT,
FACQUAL, FACDIST, and ADMDIFF

Variable		Beta	B	SE _B
SRACE	= Student racial characteristic	.116*	.019	.0070
RESOURCES	= School district fiscal resources	-.261**	-.0081	.0022
INCOME	= Average income of the families in the school district	.364**	.00076	.00010
SFRAT	= Student-faculty ratio	-.133*	-.347	.143
FACQUAL	= Faculty qualifications	.182**	.079	.025
FACDIST	= Faculty distribution	.122*	19.47	7.06
ADMDIFF	= Administrative differentiation	-.193**	-6.32	1.77

*Coefficient is twice its standard error.

**Coefficient is more than three times its standard error.

R = .44

R² = .19

n = 508

APPENDIX E

MATRIX OF SIMPLE CORRELATIONS

APPENDIX E

MATRIX OF SIMPLE CORRELATIONS

	X ₁	X ₂	X ₃	X ₄	X ₅	X ₆	X ₇	X ₈	X ₉
X ₁ = SRACE	1.000								
X ₂ = SIZE (log)	-.086	1.000							
X ₃ = RESOURCES	-.124	.383	1.000						
X ₄ = INCOME	.070	.559	.427	1.000					
X ₅ = SFRAT	.034	.146	-.573	-.090	1.000				
X ₆ = FACQUAL	-.003	.594	.613	.533	-.137	1.000			
X ₇ = FACDIST	.035	.261	.367	.294	-.217	.326	1.000		
X ₈ = ADMDIFF	-.123	.883	.492	.489	-.011	.550	.293	1.000	
X ₉ = SA	.196	.039	.018	.311	-.061	.167	.169	-.020	1.000

APPENDIX F

CRITERION FOR THE INTERPRETATION OF THE
MAGNITUDE OF THE PATH COEFFICIENTS

APPENDIX F

CRITERION FOR THE INTERPRETATION OF THE MAGNITUDE OF THE PATH COEFFICIENTS

Magnitude of Path Coefficient	Label
Up to .100	Very small
.101 to .200	Small
.201 to .300	Moderately small
.301 to .400	Moderate
.401 to .600	Moderately strong
.601 to .800	Strong
.801 and above	Very strong

Source: Based on usage in Lewis (1973) and Bidwell and Kasarda (1975).

APPENDIX G

CRITERION FOR THE INTERPRETATION OF THE MAGNITUDE OF THE COEFFICIENT OF DETERMINATION

APPENDIX G

CRITERION FOR THE INTERPRETATION OF THE MAGNITUDE OF THE COEFFICIENT OF DETERMINATION

Magnitude of the Coefficient of Determination	Explanatory Power of Independent Variables
Up to .04	Negligible
.05 to .16	Low
.17 to .36	Moderate
.37 to .64	Marked
.65 and above	High

SOURCE: Derived from Franzblau's (1958, p. 81) criterion for the interpretation of the coefficient of correlation.

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