Organizational effectiveness of cooperatives using error-in-variables and a factor analytic approach

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ORGANIZATIONAL EFFECTIVENESS OF COOPERATIVES USING ERROR-IN-VARIABLES AND A FACTOR ANALYTIC APPROACH

Iowa State University          PH.D.          1980

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Organizational effectiveness of cooperatives using error-in-variables and a factor analytic approach

by

Leonidas Theodoros Kazakopoulos

A Dissertation Submitted to the Graduate Faculty in Partial Fulfillment of the Requirements for the Degree of DOCTOR OF PHILOSOPHY

Department: Sociology and Anthropology
Major: Rural Sociology

Approved:

Signature was redacted for privacy.

In Charge of Major Work

Signature was redacted for privacy.

For the Major Department

Signature was redacted for privacy.

For the Graduate College

Iowa State University
Ames, Iowa
1980
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CHAPTER 1.
INTRODUCTION

Orientation to research problem

From a historical point of view, causal analysis of unobserved variables is a recent and significant development in social science methodology (Jacobson and Laloo, 1974, p. 215). Jacobson and Laloo point out that the time approaches when untested assumptions in social science research may be tested explicitly, which is especially important for sociological measurement due to the problems that were faced in the past.

Originally, path analytic techniques which were promoted by sociologists (Duncan, 1966; Blau and Duncan, 1967) considered disturbance terms but ignored unmeasured variables. However, the work of many sociologists since the late sixties has employed unmeasured variables, that is, unobserved constructs that are not directly measured, but which are taken as antecedents for relationships among observed variables.

Over the past ten years there has been a significant development of interest in structural equation models within the social sciences. Structural equation models have provided the foundation for research in social stratification for nearly a decade (Blau and Duncan, 1967; Bielby et al., 1977). As Goldberger (1973, p. 1) points out, various substantive areas have been covered in the research literature dealing with structural equation models such as macroeconomic policy formation, intergenerational occupational mobility and evaluation of social action programs. Especially, the causal modeling approach to measurement error
by using multiple indicators has been developed in the sociological literature within the past seventeen years (Curtis and Jackson, 1962; Siegel and Hodge, 1968; Blalock, 1969; Blalock, 1970; Costner, 1969; Heise, 1969a; Wiley and Wiley, 1970).

Goldberger (1972, p. 989) points out that sociologists have illustrated that least-squares regression is an inadequate tool for structural estimation. In a later comment, Goldberger (1973, p. 2) reiterates that conventional regression is satisfactory if we are satisfied to "trace out" the course of the mean value of a dependent variable as the value of an independent variable varies. But more generally it will be inefficient if we wish to characterize the mechanisms that generated the observation in terms of more fundamental parameters. He delineates three cases where regression is an inappropriate estimation procedure. These cases involve: (1) unobservable variables (errors of measurement); (2) simultaneity (reciprocal causation) and (3) omitted variables (inadequate control or specification error).

In fact, several articles have focused on the distortions that may be produced by standard least-squares estimating procedures when measurement error is present (Gordon, 1968; Blalock, 1969). Bohrnstedt and Carter (1971, pp. 130-140) contend that estimates of paths and other regression parameters based on uncorrected correlations are biased. The main point is that correcting for measurement error leads to quite different substantive conclusions. The problem is further intensified if we consider that estimates of indirect effects are especially vulnerable
to measurement error. Blalock (1964, pp. 147-150) has illustrated the three variable cases. Other researchers have also noted the undesirable effects of measurement error upon causal analysis (Siegel and Hodge, 1968, pp. 28-29) or multiple correlation coefficients (Warren et al., 1974, p. 886). In a recent study, Kohn and Schooler (1978, p. 39) illustrate in their findings that correlations may be radically underestimated when they are not corrected for the attenuation that results from unreliability of measurement. Also, Alwin (1973, p. 389) found support for the point of view that measurement error and attitude change are important sources of bias in attitude-behavior relationships.

Specification error also produces undesirable outcomes. A specification error takes place if a particular set of relations is assumed to exist when it does not. Specification errors that falsely introduce causal priorities or falsely eliminate disturbance terms may lead to serious distortions in coefficient estimation and to serious misunderstanding of a system (Heise, 1975, p. 191). A major conclusion that can be drawn from the above discussion is that parameter estimates made from imprecise measurements generally are biased. This problem according to Heise (1975, p. 184) is not amenable to solution even by increasing sample size. Heise points out that fallible measurement is an aspect of the identification problem. To estimate the parameters, we need to estimate the variances of measurement error in addition to the other system parameters and we usually hope enough information is available. An alternative for the measurement problem includes the use of multiple indicators. In this case the analysis becomes more complex
in incorporating all the information such as the case of factor analysis or canonical correlation analysis.

The use of multiple indicators in social research and techniques to estimate reliability led originally to the introduction of the correction for attenuation as a more precise estimation procedure than the least-squares procedure. However, an inherent problem with the correction for attenuation has been the lack of a sampling theory of the estimates (Warren et al., 1974, p. 886).

It seems evident from the above discussion that there is a need for statistical tools that will help us to increase the validity of our inferences in sociological research. Methodological terms which have been used to address the above problems are quite diverse and can probably be subsumed under the more general term of structural equation models. Goldberger (1973, p. 1) identifies three common issues under the more general notion of the structural equation models; first, the fact that nonexperimental data demand more elaborate statistical procedures as a substitute for conventional experimental control; second, many of the models developed contain unobserved variables which influence the relationships among observed variables; and third, the models are composed of several equations that interact together. The notion of system and simultaneity are relevant here.

This dissertation intends to use statistical procedures which consider the above features and hence go beyond conventional regression and analysis of variance. Bielby and Hauser (1977, p. 139) point out the significant lag which appears between the exposition of new or more
powerful methods and sophisticated empirical applications of them. Models with unobservable variables are noticeable for this lag. Also Goldberger (1973, p. 1) notes the need for a consolidation of the progress which has been made in the direction of structural equation models with unobservable variables and for a clarification of the remaining issues. Hopefully, this study is just such an effort in both directions.

Objectives of the study

The general objective of this study is twofold: first, to reformulate and expand a model of cooperative organizational effectiveness developed and tested by Warren et al. (1976) within the context of a series of studies called by Etzioni (1975, p. 142) "Iowa State Compliance Studies"\(^1\). Second, to consider measurement and specification error in the estimating procedures so that the substantive implications of the study are more rigorous.

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\(^1\)Etzioni by using this label refers to a set of around fifteen reports and publications dealing with compliance correlates. These studies are the products of research efforts extending over a period of 15 years at Iowa State University, Ames, Iowa. Two major areas of research were covered by these studies: (a) the Civil Defense Preparedness Agency (a normative organization) and (b) farmer cooperatives (a utilitarian organization). A large number of scholars and researchers was involved in conducting these studies. In the late 1950's Drs. George M. Beal and Joe M. Bohlen started assembling a research team to study the interplay between individual and organizational phenomena. In 1960 Gerald Klonglan and Richard Warren joined the team. In 1965 Charles Mulford became team member. These five team members acted as co-principal investigators of several studies (Etzioni, 1975, p. 142).
This general objective is to be accomplished by examining the effectiveness of a number of farmer cooperatives within the theoretical framework of an open-system perspective. It is hypothesized that environmental variables external to the organization affect in a congruent way most of Etzioni's compliance correlates as internal to the organization variables and finally both sets of variables are hypothesized to determine either directly or indirectly organizational effectiveness. The external (exogenous) variables of our proposed model include: selectivity, elite consensus, market potential, competition and size. The internal or endogenous variables include: structural differentiation, scope, pervasiveness, socialization, communication, salience and tension.

Many scholars have pointed out the need for empirical studies of organizational effectiveness (Yuchtman and Seashore, 1967; Price, 1968; Mulford et al., 1972; Warren et al., 1973). Organizational effectiveness is further a key theme in Etzioni's discussion (1975, pp. 121-152).

The emphasis of the present study on certain environmental aspects beyond Etzioni's compliance correlates in a model of cooperative organizational effectiveness is an outcome of the following three considerations.

First, although Etzioni does not discuss size explicitly, the organizational literature has focused on its importance for the study of organizations (Blau, 1970; Pugh et al., 1968; Blau, 1972; Meyer, 1972; Child, 1972). Evers et al. (1976) examined the moderator effects of size on structure indicators. Also, Aziz (1978) replicating Warren et al. study (1976) included size in this analysis as a control variable and
also took into consideration measurement error.

Second, the present study besides size also introduces competition and market potential as another subset of environmental factors that may be important in a model of cooperative organizational effectiveness. Contingency theorists (Burns and Stalker, 1961; Thompson, 1967; Lawrence and Lorsch, 1967) have focused on the role of task environment which potentially includes the market for the behavior of business firms. Furthermore, Pfeffer and Leblebici (1973, p. 268) note that competition as one dimension of an organization's environment has played a major role in economic theory, but has not often been studied by organization theorists. Only a few studies among organizational sociologists have included competition as an antecedent variable (Rose, 1955; Yetley, 1974). Market potential seems also to be another dimension of the environment which has implications for organizational profits and hence its relationship to compliance correlates must be considered. Evan (1972, p. 330) talks about "output organization sets" to emphasize the fact that an important dimension of the organization's environment for consideration is the disposal of its product or service to a market. This dimension is considered important in the present study since securing a market is a vital need for the nature of organizations studied. Concentration of organizational output to one, few or unlimited buyers it is expected to affect the structure and functioning of the organization.

Third, selectivity and consensus are treated as vital organizational inputs in the context of the present study. Through selectivity the organization secures staff and labor, what Azumi (1972, p. 91) designates
as basic social resources or inputs for the organization. Etzioni (1975, p. 260) also stresses the importance of selectivity for utilitarian organizations such as farmer cooperatives. He maintains that an organization does not exist in a vacuum and a way of interacting with the environment is by practicing recruitment selectivity. Furthermore, consensus among organizational elites, an area of focus in the present study, is taken as a form of technological input. Technology is conceptualized in the broad sense as similarity of ideas or strategies among organizational representatives (Champion, 1975, p. 101). That is, the emphasis is not on the raw material processed, but as Perrow (1967, pp. 196-197) points out, on the way the institution defines it.

In short, the present study from a theoretical point of view focuses on environmental aspects of organizations as they relate to compliance correlates. Hall, Haas and Johnson (1967b) report strong relationships between compliance and the external environment. Etzioni (1975, p. 460) views their effort as significantly extending the study of compliance correlates. This is one of the general objectives of the present study by reformulating and expanding a previous model of Etzioni's theory.

The second general objective of this study, methodological in nature, stems from a relative lack of empirical studies using estimation procedures that take into account measurement errors. Faisal and Warren (1978, p. 3) note that attempts to adjust for measurement error are relatively new. They also add that journal articles correcting for attenuation appear to be somewhat frequent in the literature. However,
more refined statistical techniques handling measurement error problems are also to be found in the literature but with much less frequency (Bielby and Hauser, 1977; Faisal and Warren, 1978). The present dissertation will attempt to use and compare two available general techniques which can be used to "correct" for the effect of measurement errors.

The first technique is the Error-in-Variables regression technique which basically provides estimates of parameters and standard errors for testing the estimators. It was developed in the Department of Statistics of Iowa State University by Professor Fuller and his associates (Fuller, 1971; Degracie and Fuller, 1972; Fuller and Battese, 1973; Warren et al., 1974). Also, the Statistical Department of Iowa State University has furthermore developed a computer program (Hidiroglou, Fuller and Hickman, 1977) called SUPER CARP that has cut down considerably the amount of energy and expertise required to use this approach.

A second alternative technique is Joreskog's confirmatory factor analytic approach for the analysis of linear structural equations systems by the method of maximum likelihood (LISREL). This method was gradually developed by Joreskog and his associates (Joreskog, 1969; Joreskog and van Thillo, 1972; Joreskog and Sorbom, 1977; Joreskog and Sorbom, 1979). Generally, this procedure provides efficient estimates of the parameters and also a chi-square statistic which allows hypothesis tests to be made. Finally, Joreskog procedure has been formalized in a computer program with its most recent version under the name, LISREL IV (Joreskog and Sorbom, 1979) which overcomes the difficulty of calculations.
To summarize, the specific objectives of this study are:

a. To discuss and develop a reformulated model of organizational effectiveness (including Etzioni's (1975) compliance correlates as throughout variables within an open-systems framework - that incorporates environmental factors and the input variables with both being considered exogeneous to the model,

b. To conceptualize and measure certain old and new concepts that will be included in the reformulated model,

c. To present a brief discussion on structural equation models and the path analytic approach to measurement error,

d. To discuss briefly and present the Ordinary Least-Squares approach, the Error-in-Variables approach and Joreskog's factor analytic approach, and

e. To compare the Error-in-Variables procedure, Joreskog's factor analytic procedure and Ordinary Least-Squares regression procedure by testing a causal model of organizational effectiveness.

Contributions to sociological inquiry

This research effort is thought to make a twofold contribution to sociological inquiry. First, the theoretical import of the study is that building upon fruitful previous theoretical and research efforts reformulates and extends Etzioni's compliance model by considering environmental factors in a causal model of cooperative organizational effectiveness. Although Etzioni (1975, p. 148) acknowledges the
importance of the environment in shaping organizational structure and functioning, he chose to emphasize in his theoretical endeavor only compliance correlates. By examining in the present study the relationship of environmental factors to compliance correlates and their overall contribution to organizational effectiveness, it is expected that a more encompassing and general theory of organizational behavior will be developed. Second, the methodological contribution of this study consists in using and comparing relatively new statistical tools of sociological investigation which consider measurement error in our variables and hence increase the rigor and validity of our inferences. The apparent need for the development and diffusion of these techniques has not received the expected attention in the sociological literature (Bielby and Hauser, 1977, p. 139). A comparison of these two procedures will be helpful in delineating potential advantages and limitations of each and hence facilitate decisions about their utility under specific circumstances and needs. Finally, it is expected the empirical assessment of the true relationships between compliance correlates and environmental factors will be informative for practical applications. Certain benefits may accrue to organizational managers and administrators who are seeking strategies to design more effective and efficient organizations, especially when the relationships examined are adjusted for measurement error.
CHAPTER 2.
THEORETICAL ORIENTATION

Introduction

In this chapter a discussion on organizational models, particularly Etzioni's compliance scheme and the open-system perspective, will be presented. A preliminary theoretical rationale for the major conceptual areas that are to be included in the causal model of cooperative organizational effectiveness will be outlined. This will be followed by a conceptual elaboration of the specific variables of the model. Finally, the theoretical and empirical rationale for the specific hypotheses of the cooperative effectiveness model will be discussed.

Organizational models and Etzioni's compliance model

Many approaches for investigating organizational behavior have been developed under the more general term of models. Katz and Kahn (1966, p. 18) have suggested that models are either closed or open-system schemed. Closed-system models rely almost wholly upon processes within organizations to account for organizational behavior. Open-system models, on the other hand, stress the interrelationship of organizations with their environments and seek explanations of organizational behavior among factors outside of the immediate organizational boundaries. Champion (1975, pp. 29-31) further subdivides the closed-system category into the "rational" and "nonrational" systems. The rational assumption is that planned outcomes will follow planned organizational structures and processes. Under this subheading are included the machine models.
of scientific management (Taylor, 1911) and bureaucracy (Weber, 1947),
the goal model and the decision model (March and Simon, 1958; Simon,
1957). In contrast, the nonrational assumption is that planned organiza­
tional structures and processes may have unanticipated consequences or
outcomes (Champion, 1975, p. 30). The role of attitudes and sentiments is
an important motivating factor here. The human relations model with Mayo
in the 1920's, the professional model (Litwak, 1961) and the equilibrium
model (Barnard, 1938 and Simon, 1947) can be subsumed according to
Champion under the nonrational approach.

Etzioni (1975, pp. III-V) has pointed out that recent models of
formal organizations have not addressed in equal proportions an interest
in structural and motivational variables, but have tended to emphasize
one or the other. Etzioni's criticism seems to be leveled against both
assumptions: the rational and the nonrational assumption of the closed­
system perspective. Etzioni, (1975), pp. 14-15) criticizing the Weberian
approach, notes that authority in the Weberian model disregards differ­
ences among power other than their legitimacy. Etzioni (1975, p. 15)
develops his typological scheme of compliance relationships as a way to
"give full status to both legitimate and nonlegitimate sources of
control." In addition, he contends that power is central to his model
while it is not considered in Weber's typology of foundations of social
order (Etzioni, 1975, p. xvii). Furthermore, he argues that Weber rather
fails to distinguish between types of sanctions (physical, material or
symbolic) which consist the basis of power.
Regarding the goal model, Etzioni (1960, pp. 257-258) maintains that the majority of organizations do not accomplish their goals in any full sense. He further contends that the application of the goal model leads to an unrealistic comparison between ideal and real organizational goals (Etzioni, 1960, pp. 257-258). This, in his view, may finally lead to downgrading organizational goal attainment.

Etzioni (1975, pp. 3-21) has developed a classificatory and analytical schema build around various forms of compliance behavior. Compliance according to Etzioni (1975, p. 3) is universal, existing in all social units. It is a major element of the relationship between those who have power and those over whom they exercise it. Accordingly, Etzioni (1975, p. xv) refers to compliance as "a relationship consisting of the power employed by superiors to control subordinates and the orientation of the subordinates to this power." Hence, compliance consists of a structural and a motivational aspect and in this respect integrates assumptions of both the rational and the nonrational model in the closed-system perspective. The structural component pertains to the kinds and distribution of power in organizations. The motivational aspect is concerned with the degree and types of involvement of actors in the organization. In short, Etzioni attempts to articulate in his organizational analysis both the social system and the personality system. He further attempts to show that compliance is related to many organizational variables. These variables pertain to the organizational goals pursued, the behavior of elites, the consensus attained through communication and socialization practices, the recruitment, scope and pervasiveness, and finally the
distribution and control of participants. Organizations are classified in terms of the mechanism used to control the behavior of "lower level participants." The latter term designates all those who are subject to the power in the organization. It is the counterpart of the "organizational elites" or "representatives" who exercise power.

Etzioni (1975, pp. 23-68) has classified control modes into normative, utilitarian and coercive. Organizations that attempt to control behavior through getting the members to accept certain beliefs or normative standards or to give unquestioned loyalty to their leaders are said to exercise normative means of control. For instance, it can be seen in the behavior of the members of a political party who are deeply committed in its goals. Organizations that greatly stress the rewarding of conforming behavior are said to employ a utilitarian mode of control. Business and industrial firms are a common example. Organizations such as prisons which control the behavior of their members through the threat of coercive power (e.g. physical punishment) are said to employ a coercive mode of control.

Etzioni (1975, pp. 9-11) contends that each mode of control elicits a distinctive kind of involvement with the organization as the part of those subjected to it. Involvement refers to the "cathectic-evaluative orientation of an actor to an object, characterized in terms of intensity and direction" (Etzioni, 1975, pp. 8-9). The intensity of involvement varies from low to high and may have a positive or negative direction. Etzioni (1975, p. 9) refers to positive involvement as "commitment" and to negative involvement as "alienation." Alienative
involvement designates an intense negative orientation; it is predominant among hostile foreigners. Calculative involvement may consist of a negative or positive orientation of low intensity. Entrepreneur relationships in modern rational capitalism provide an example. Moral involvement designates a positive orientation of high intensity such as the loyal follower in his leader. Furthermore, two forms of moral commitments are distinguished by Etzioni (1975, p. 10). "Pure moral commitments" based on internalization of norms and identification with the authority of the organization and "social commitment" based on a sensitivity to pressures from members of the individual's primary group.

Generally, typologies are ways of describing or labeling differences among organizations. However, as Champion (1975, p. 65) suggests, no typology is fully comprehensive, and all are associated with exceptions. The usefulness of typological schemes consists in classifying the universe of organizations and hence facilitating the discovery of important similarities between them with potential theoretical and substantive significance.

Certain criticisms have been leveled against Etzioni's typological scheme. Etzioni recognizes the presence of mixed types, containing more than one form of power and involvement in his classification-scheme. Hall (1977, p. 205) maintains that these combinations and difficulties in placement weaken the formulation as a typological scheme but takes the correlates of these compliance patterns that Etzioni identifies as important. Etzioni (1975, pp. 119-120) explains the existence of incongruent types, in part, as due to external factors which reduce the
power of superiors in organizations (e.g. membership of lower participants in other groups) and also due to various value commitments. Perrow (1972, p. 165) also charges Etzioni with "neglect of wide ranges of differences within the types." He views his typology as tautological. Furthermore, Perrow (1967, p. 195) has indicated that schemes which focus upon a single dimension of organizational structure or process neglect other equally or more important dimensions which should be considered. Etzioni (1975, p. 74) responding to these charges, contends that the analytic classification of an organization is tautological in the sense that names of analytic variables and what they denote must be in accordance, but he maintains that the consequences of such a compliance base for other variables are not "derivable" from the compliance characterization. Finally, a critical approach towards Etzioni's typology was taken by Hall, Haas and Johnson (1967b). Their criticism is based on empirical findings. They studied seventy-five organizations which formed the basis for examining among other typologies, Etzioni's scheme. Their major criticism was that the diversity of involvement on the part of the organization members makes placement in the major types extremely difficult in many cases.

Although Etzioni's typological scheme is not free of limitations, the fact that it encourages comparative study of organizations enables one to make stronger generalizations than a study based on only one class of organizations. It further promotes theory development. Iowa State University's studies of social organization have mainly utilized Etzioni's theory in normative and utilitarian organizations. In his view
these studies represent the most systematic and comprehensive effort in testing his theory and thus lead to a richer and more precise organizational theory. Nevertheless, Etzioni (1975, p. 26) modestly admits that his scheme is "a first approximation, a beginning, not an end." He is primarily aiming toward the study of compliance and its correlates.

**Etzioni's compliance variables and the open-system model**

Etzioni's message is that compliance is the basis for a more general model of organizations. Etzioni's alternative is a system model. The notion of "system" is not new in the sociological literature. System as a perspective is evident in Parsons' (1951) work. The Parsonian social system is especially better known with its emphasis in solving four universal functional problems (AGIL scheme): (a) goal-attainment or definition of the purpose of its being; (b) adaptation or determining what resources to use for survival in the environment; (c) integration or establishing the means for coordinating its efforts and (d) pattern-maintenance or solving the above three problems with the minimum strain and tension. Parsons (1956, pp. 228-230) illustrates how organizational systems can be classified according to these four functional problems. The major thrust of Talcott Parsons' approach lies in his assumption that the same functional requirements or problems must be dealt with at every level of system organization (Lyden, 1975, p. 59). Considering the whole range of social units from the societal to the organizational or suborganizational level, survival is attained only by resolving these functional problems which are interdependent within and among each level.
of social organization. The notion of input-output relationships, although not given the same emphasis as in the open-system perspective is quite evident in Parsons' work.

In Gouldner's (1959, p. 406) view the Parsonian system model exemplifies what he calls a "natural system" model, which he distinguishes from the "rational system" model. The term "natural-system" model, introduced by Gouldner (1959), has been used by many authors as tantamount or precursor of the present widely used term "open-system" model (Champion, 1975, pp. 55-57; Hall, 1977, p. 56). The rational-system model applies more to the closed-system or Weberian approach to organizational analysis.

Etzioni (1975), p. 141) in conceptualizing the organizational system, notes that he "leans toward more 'grounded' or concrete conceptualizations than previously," without questioning the virtue of an abstract overlay." By "abstract overlay" he rather implies the highly analytic character of the Parsonian concepts for organizational systems; however, he acknowledges that empirical tests of these distinctions have been reported in the study of organizations. In fact, Etzioni (1975, pp. 142-150) devotes several pages and also another whole chapter (ch. SVI) in his new edition to discussing and summarizing the major findings of Iowa State studies that have applied the Parsonian framework to the study of compliance. Etzioni (1975, p. 135)—in his footnotes—also recognizes similarities between the "natural systems" model, and his

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1 The emphasis is added by the author.
"system model" since the former also "studies the organization as a whole and sees in goal realization just one organizational function" (Etzioni, 1975, p. 135). He (Etzioni, 1975, p. 135) further delineates two aspects in which he perceives to differ. The natural system is an empirical entity while his is "a functional model," hence a conceptual device or "construct." In addition, Etzioni avoids in his system notion such assumptions about organizational structure as that it is "spontaneously and homeostatically maintained" which typify the natural system model. These distinctions and similarities become more evident when Etzioni discusses his "mobilized effectiveness model." Goal attainment is given primary importance among other goals or functional alternatives within his system notion. Furthermore, his emphasis on purpose, guidance and the rejection of a "collectivistic, uncybernetic model" is an indirect way to stress the importance of rational elements in his "system model."

A more detailed discussion on Etzioni's "mobilized effectiveness" system model is reserved until the variable of organizational effectiveness is conceptualized. It appears that Etzioni's more recent conceptualization of the organizational system is more congruent with the "open-system" model as developed by Katz and Kahn (1966, 1978) or Thompson (1967). However, the Parsonian influence on this conceptual edifice cannot be denied as will be illustrated immediately.

The open-system model has been more fully developed by the works of Katz and Kahn (Hall, 1977, p. 57). Katz and Kahn (1978, p. 269) recognize the conceptual contribution of Talcot Parsons in formulating their open-system perspective. They point out that:
Although Parsons has been criticized for his scant recognition of conflicting interests and values, he has contributed to an understanding of organizations by his careful analysis of the significant internal functions they must perform. Here, he shifts the frame of reference from secondary societal effects to the primary task of the organization itself in attempting to survive. We have followed his lead in identifying and describing the productive, maintenance, adaptive and institutional (boundary) subsystems of organizations.

That is, Parsons was first to identify the institutional, managerial and technical subsystems of the organization. His categories can be construed to parallel the intraorganizational (technical), the interorganizational (managerial) and the extraorganizational levels of analysis (Terreberry, 1968, p. 78) that Emery and Trist (1965, pp. 21-31) delineate in their concept of "the causal texture of the environment." Katz and Kahn, (1978, pp. 51-59) drawing on the work of Parsons, have further distinguished the above mentioned organizational subsystems. What they view as lacking in Parsons' writings is the lack of specificity in operational procedures for managing environmental transactions.

Katz and Kahn (1978, pp. 23-24) have attempted to identify the input-throughout-output cycle in organizations as well as the processes of entropy, dynamic homeostasis, differentiation and equifinality. The emphasis is much more oriented to the study of processes than structures (Scott, 1977, p. 74). Examination of input, throughout, and output processes of materials, information and energy are central to the analysis. Here is probably the basis for some of the criticisms of the Parsonian model in that it does not sensitize the researcher to the dynamics of social units.
Both Katz and Kahn (1966) as well as Thompson (1967) bring some rational considerations within their open-system model although they never argue that it possesses the complete rationality of a closed-system model. This study adopts the open-system model which has mainly been developed by Katz and Kahn (1966) and Thompson (1967). This model recognizes elements of "rationality" and "organizational intent" (Hall, 1977, p. 59) and it seems more congruent with Etzioni's "mobilized effectiveness" system notion.

Katz and Kahn's notion of open-system, especially their systematic feature of "systems as cycles of events," implies that organizational activities involve also rational elements and are not a byproduct of random action. Thompson's (1967, pp. 19-24 & 66-82) discussion of "internal" and "external" constraints on rationality is a further example of an "open-system" notion which involves rational considerations. This rational element is also apparent in Etzioni's systemic notion, especially in what he calls the "mobilized effectiveness" model.

There are three key assumptions under an open-system model (Azumi and Hage, 1972, p. 11): first, organizations are viewed as entities composed of interrelated variables so these variables compose a system; second, the system in itself is a component of the environment and in turn the system has key components in it, and third, feedback of information is an important regulatory process.

The present study attempts to combine Etzioni's compliance correlates as "throughput" variables within the framework of an open-system perspective. As exogenous variables of the cooperative organizational
effectiveness model are developed, three set of variables or conceptual areas. These conceptual areas have also received empirical and theoretical attention in the past. They are: (1) input variables; (2) environmental variables; and (3) organizational size. Furthermore, we distinguish throughput and output variables as the endogenous or dependent variables of the effectiveness model.

Environment

The environment imposes the parameters within which the organization must function and carry out its activities. Organizational inputs in the form of human resources, raw materials and/or technology are drawn from the environment (Warren and Evers, 1974, p. 7). Generally, the environment of a system refers to a number of conditions or elements that are perceived to be outside of system boundaries (Buckley, 1967, p. 62). Environmental influences are quite important for organizational structure, processes and performance. Katz and Kahn (1978, pp. 30-33) suggest that it is fallacious to view environmental influences as "error variances." Etzioni (1975, pp. 148-149) further asserts that "an effective compliance, goal combination" may be constrained by environmental factors affecting anyone of the three major variables making up the relationship: involvement, power or goals. He points out that for analytic and practical purposes it is necessary to try to identify which parts of the performance of an organization are due to external conditions and which parts are due to internal factors, the compliance pattern.
The present study focuses on that portion of the environment that usually is referred to as the "task environment" or organization and in the context of the present study is operationalized as the market environment of the agricultural cooperative firms. Contingency theory has accentuated the role of market for the behavior of business firms. Major contingency theorists such as Burns and Stalker (1961), Thompson (1967), Lawrence and Lorsch (1967) give a great deal of weight to the interplay between the organization and its task environment.

The concept of task environment was first suggested by William R. Dill (1958) to indicate those components of the environment that are significant or potentially significant for goal setting and goal attainment. The task environment according to Dill includes customers, suppliers, competitors and regulatory groups. As Hall (1977, p. 61) puts it, organizations attempt to "fit" their structure and processes to the perceived environment. The form of the organization is thus contingent upon the environment. Hence, the above components of the task environment are expected to determine the range of organizational adaptation through modification of its structure (Khandwalla, 1977, pp. 236-237).

It must be noted that system theory is more encompassing than contingency theory. According to Khandwalla (1977, pp. 225-227) system theorists (open-system model) attempt to incorporate a large number of variables: personal, social, technical, structural and environmental. On the other hand, contingency theorists are mainly interested in on the structural adaptation of organizations to their task environment. The present study subsumes contingency theory under the open system model, which is quite broader.
The importance of the task environment also goes far beyond determining organizational structure and processes. Pennings and Goodman (1977, p. 15) maintain that in addition to the intraorganizational conditions for effectiveness, environmental parameters such as suppliers, competitors or regulatory agencies are also crucial in accounting for interorganizational conditions in effectiveness.

In the cooperative organizational effectiveness model to be developed, environmental aspects are posited to play a major role in affecting organizational effectiveness either directly or indirectly by determining "congruent" internal organizational structures and processes. Two environmental variables are used in the present study: (1) market potential and (2) competition.

Inputs

Environmental inputs are also considered a crucial aspect of open-system analysis. In some general sense the inputs represent the importation of energy in some form or other from the environment and its transformation through throughput processes into outputs (Khandwalla, 1977, p. 225). Open system analysts consider that organizational inputs affect the system in some way. Azumi and Hage (1972, p. 100) point out that "the problem of how acquisition of resources affects organizational structure has been one of the more exciting and recent developments." That is, organizational inputs seem to modify the organizational system in some way. Furthermore, Hannan and Freeman (1977, p. 121) view organizational inputs as a "fixed constraint in modeling performance." They further suggest that those organizations which are able to select inputs fitting
their needs are more effective.

It seems also that when Etzioni (1975, pp. 148-149) talks about "an effective compliance-goal combination" constrained by environmental parameters, this at least implies the importance of environmental inputs for organizational structure, processes and effectiveness. His concept of selectivity seems to be parallel to Hannan and Freeman's (1977) argument. Other studies have noted the importance of inputs for organizational effectiveness (Mulford and Klonglan, 1972). The present study will examine the relationship of two inputs with Etzioni's compliance variables and organizational effectiveness: selectivity and elite consensus.

Organizational size

A final conceptual area that the present study is going to examine among the exogenous variables of the model is that of size. Size is apt to be a major factor determining organizational structure. Classical bureaucratic theories suggest that increasing size inevitably brings with it bureaucratization. Some authors base general theories of organizational processes on the apparent effects of size (Blau, 1970; Blau and Schoenherr, 1971). Other authors also maintain that the impact of size on other organizational characteristics cannot be underestimated. Size must always be controlled when analyzing relationships among properties of organizations (Meyer, 1972, p. 440). Evers et al., (1976, pp. 336-337) found size to determine structural variables in 153 farm cooperatives they studied. According to Kimberly (1976, p. 574) it seems that
a clear cut conceptual definition of size is lacking. The present study conceptualizes size as a "contextual" variable. Pugh et al. (1963) suggest that the study of structure and processes of an organization in relation to each other and the social and economic context in which they are found. In a later study (Pugh et al., 1969) delineated size as one among other contextual variables held to be relevant to organizational structure. By "contextual" they mean "the setting within which structure is developed" (Pugh et al., 1969, p. 91).

Throughputs

Every open system processes the energy available to it. According to Katz and Kahn (1978, pp. 23-24), these transformation processes of inputs refer to the throughputs of a system. In other words, structural arrangements and processes that convert inputs into output are subsumed under the "throughput" concept. An analytical classification of these structural variables and control processes has been developed by Azumi and Hage (1972, pp. 513-517).

Georgopoulos (1973, p. 105) accentuates the importance of the throughput processes for organizational outputs by contending that the social psychological processes they subsume may operate as an intervening factor in the input-output relationship.

The concepts used to represent the throughput construct in the present study are: first, Etzioni's compliance correlates which include the variables of scope, pervasiveness, socialization, communication, salience and tension; and second, the variable of structural differentiation.
Outputs

The last major conceptual area of the systemic model is the construct of output. Output is whatever transpires from an organization to its environment in the form of product or services. Earlier work using the present set of data, Evers, Warren and Rogers (1973) Warren, Rogers and Evers (1975b) departing from Parsons' AGIL scheme, delineated four specific categories of output in agricultural cooperatives according to the following classification:

1. Efficiency - integrative function
2. Satisfaction - pattern maintenance and tension management
3. Productivity - goal attainment function
4. Flexibility - adaptive function.

Following Evers (1979, p. 87) in this respect, these categories are treated as outputs rather than as organizational goals with the open-system notion employed here. The present study focuses primarily on the aspect of productivity which corresponds to the goal attainment function of the Parsons' AGIL scheme. This emphasis is preferred in the context of the present study since Etzioni's compliance variables are a major component of the effectiveness model. Furthermore, Etzioni (1975, pp. 135-138) in his "mobilized system" notion and in addition in his "mobilized effectiveness model" stresses the importance of goal attainment over other organizational goals. Also, various authors have

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1 Although, the present study follows this theoretical reasoning; however, Warren, Rogers and Evers (1975b) concluded in their study that cooperatives in general are unique in putting more emphasis than other businesses on integration and pattern maintenance because of their owner-customer relationship.
accentuated the fact that agricultural cooperatives have been formed in an effort to advance economic goals (Loomis and Beegle, 1950, p. 650; Wakely, 1957, p. 275; Ryan, 1970, p. 10). This of course does not preclude the importance of other goals pursued by agricultural cooperatives. Variables measuring output effectiveness in the present study are: (1) net operating revenue, (2) net savings and (3) role performance of the managers of agricultural cooperatives.

It appears, however, that the influence of environmental conditions directly or indirectly on organizational outputs and effectiveness is not quite clear (Bidwell and Kasarda, 1975, p. 55). The present study considering this ambiguity will follow the "congruency notion" and examine the impact of environment on organizational structure and processes as well as on output effectiveness by developing a structural model of cooperative organizational effectiveness.

The preceding more general discussion on the relationships between the major sets of variables in the model serves the function of a preliminary theoretical rationale. However, instead of postulating an overall impact of the environmental variables on organizational structure, processes and effectiveness, more specific hypotheses will be developed whenever theoretical rationale and empirical evidence is available, linking the environmental variables either directly or indirectly through organizational structure and processes to organizational output effectiveness. Figure 1 illustrates these preliminary relationships.

Before developing the causal model of cooperative organizational effectiveness a conceptual definition will be provided of the specific variables of this model.
Figure 1. Preliminary causal relationships among major sets of variables of the effectiveness model
Environmental input and size variables

Elite consensus Consensus is an aspect of the integration within the organization. Etzioni (1975, pp. 234-235) points out that organizations may differ either on "general consensus" or on the specific consensus that is required across "consensus-spheres." Various spheres are delineated by Etzioni such as general values, organizational goals, means, politics or tactics, participation in the organization performance obligations (duties of lower participants) and cognitive perspectives (common language, shared frame of reference) about facts. Etzioni further maintains that a central problem in the study of integration is the assessment of consensus among actors in different statuses which in his compliance model refers to lower and higher participants.

The present study does not conceptualize consensus across hierarchical levels. It rather emphasizes the consensus aspects between two major groups in the organization of approximately equal status, namely, farm coop managers and board of directors, two major subgroups which Etzioni would classify as organizational representatives. In this sense, the horizontal dimensions of the consensus concept are rather addressed than its vertical. Etzioni (1975, pp. 240-241) points out that utilitarian organizations require high consensus mainly with respect to performance obligations, participation in the organization and cognitive perspectives, since these three spheres are directly related to production goals and to the contributions of lower participants. In other words, utilitarian organizations require a high degree of consensus for effective operation in spheres concerning instrumental activities, while typical normative
organizations demand consensus on all norms directly related to expressive activities. Etzioni (1975, p. 238) finally expects that total consensus is higher in normative than in utilitarian organizations, and is more frequent in utilitarian than in coercive ones. In the last category of organizations both the degree and the range of consensus required are very limited.

**Selectivity**

Selectivity within the context of compliance theory is a screening process through which organizations try to obtain the most qualified members for the goals they purport to attain.

Etzioni (1975, p. 31) suggests that commitment increases as the selective process becomes more scrutinizing. Selectivity involves two components: criteria of recruitment and degree of selectivity. Criteria of recruitment may vary from organization to organization, while degree of selectivity refers to the ratio of actual participants over potential ones. Both affect compliance structure indirectly by determining the amount and the kind of socialization required for the effective operation of a given compliance structure. As Etzioni (1975, p. 263) points out, socialization of participants through training or education is necessary only when the criteria of recruiting participants do not meet expected standards.

Typical coercive organizations are efficient with little selectivity. Only under a changing compliance structure—that is coercive organizations that move to less coercive—may selectivity be emphasized. Utilitarian organizations compared with typical coercive ones, are highly selective since control over substance of socialization is low (Etzioni, 1975,
Normative organizations may differ considerably in their degree of selectivity. This is more apparent in religious organizations. Competition is an aspect of the organization's environment. Hall, Haas and Johnson (1967b) analyzed data on 75 organizations, correlating compliance scores with numerous organizational attributes not explored by Etzioni's original theory. Relationships between the compliance types of organizations and the external world were assessed. Competition was found to exist for all three types, but was much higher among utilitarian organizations than among normative ones, and least among coercive organizations.

The focus of the present study on competition seems to be dictated by the utilitarian nature of organizations studied and the small number of studies using competition in the sociological literature (Yetley, 1974; Pfeffer and Leblebici, 1973; Rose, 1955). Furthermore, competition has been held to affect organizational structure and processes (Champion, 1975, p. 55; Azumi, 1972, p. 98; Perrow, 1970, pp. 124-127).

Competition is a multidimensional concept (Yetley, 1974, pp. 41-42). Large and strong competition requires additional resources in the form of labor and/or advertising to maintain a given level of performance. Competition may also vary in terms of strength and number of competitors. Finally, the firm's versus the competition's impact upon the trade area may vary. The latter idea is indicated as the percentage of the market controlled by a given firm. It may lead to economies of scale for a firm which strengthen its competitive position and domination in the market.
Market potential  Market potential as used in this study, refers to the possibility of sales in the cooperatives trade area. Yetley (1974, pp. 47-48) notes that the location of the market may be an important determinant of organizational efficiency if transportation costs and business generating expenses are kept to a minimum. Market potential is especially critical for the study of utilitarian organizations.

Market was one of the three major subenvironments that Lawrence and Lorsch (1967, pp. 24-30) found in their study of chemical processing industry. Occasionally, the inclusive environment of the organization is referred to as the organizational fields or markets (Azumi and Hage, 1972, p. 33). Terreberry (1968) focuses on the fields as the independent variable that causes change in the organization. Organizational survival is maintained to be enhanced only through adaptation to a changing environment.

Organizational size  Kimberly (1976) presents in a concise way the theoretical arguments concerning the effect of size on vertical and horizontal differentiation. The conclusion that Kimberly (1976, p. 573) reached after a thorough review of past relevant literature on size is that the relationship between size and organizational structure is not unambiguous. This ambiguity is the result of both theoretical and methodological limitations.

The theoretical problems are rooted in the competing conceptualizations of size. Some authors according to Kimberly (1976, pp. 574-575) treat size as another structural parameter of organizations (Meyer, 1972) while others consider size as a contextual variable and environmental constraint (Pugh et al., 1963 and 1969; Child, 1973). Empirical
problems are associated with sampling procedures and standardization of measures. Sampling one type of organizations ("intratypical sampling") or sampling heterogeneous kinds of organizations ("intertypical sampling") has both advantages and limitations that Kimberly discusses more extensively. In short, he suggests that problems of sampling and organizational type are important in order to comprehend the relationship between organizational size and structure.

Another problematic area exists when the causal sequence between size and structure is considered. However, efforts to determine the causal status of size empirically are becoming more common, and the view that the effects of size are antecedent, that size is exogeneous in its relation to structure—currently prevails (Kimberly, 1976, p. 581). In his formal theory of differentiation, Blau (1970) assigns to size the role of a key exogenous independent variable. The main statement of the view of size as an exogenous variable can be found in the work of Blau and Schoenherr (1971, pp. 27-28). Blau and Schoenherr (1971, pp. 52-56) maintain that size is the major factor determining organizational structure. The authors found that the most prominent influence of size was that it gave rise to the differentiation of formal organizational structure in various respects. It was found that larger employment security agencies had a larger number of local offices under its jurisdiction, a greater number of official job titles indicative of the division of labor, a higher number of hierarchical levels in the authority structure, a number of major divisions under top management, and a number of sections per division. Pugh et al., (1969) indicated that size was one
of the more crucial variables for determining organizational structure. Hickson et al. (1969) and his colleagues also found that size comparative to technology exerted considerably more influence on structure as defined by their complicated scale "structuring of activities." The latter concept includes several concepts designating structural complexity such as division of labor and hierarchical levels as well as concepts such as standardization and formalization. Meyer (1968) found size correlated positively with both the number of levels in the hierarchy and the number of divisions. More recently, Meyer (1972) re-emphasized the importance of size as an exogenous variable and illustrated that longitudinal designs are necessary to examine the effects of size.

However, empirical findings have been less than conclusive. Hall and his colleagues (1967, p. 12) conclude from their research on a group of seventy-five miscellaneous organizations that "size and organizational structure are not closely related." Blau and Schoenherr (1971, p. 58) interpreting the findings of Hall et al. (1967a) point out that most of their indicators of structure comparable to theirs are in fact shown to be related to size. Although size is unrelated to number of divisions in Hall's study, it is directly related to number of sections per division, hierarchical levels and dispersed locations. Some contradictory findings come also from Woodward's (1965, p. 131) study. She states that size in the ninety-two British manufacturing firms she studied "did not appear to affect organization as much as might have been expected." Her data show that size is unrelated to the technical complexity of the production systems employed by these firms and that technical complexity exerts considerable influence.
Some more recent findings have proposed an interaction between size, technology and environment (Pfeffer and Leblebici, 1973). Dewar and Hage (1978, p. 111) in their findings support only a moderate causal connection between size and differentiation. The longitudinal nature of their research design eliminates many of the limitations and issues raised by the use of cross-sectional data.

Etzioni (1975, p. 3 and 241) considers size as an important factor affecting the compliance structure and creating problems in the organization that are at least partially tackled through increased communication flows. Recently, Mulford et al. (1977) encourage considerations of size when Etzioni's compliance model is tested.

This study holds size as a variable determining organizational structure and process.

Throughput variables

**Structural differentiation** The theoretical concepts of organizational complexity and structural differentiation have been more thoroughly and systematically examined in the organizational literature since around the mid-sixties (Hage et al., 1972; Pugh et al., 1968; Blau, 1972). Some authors (Hall, 1977, p. 139) approach the issue of complexity in such a manner so that structural differentiation is subsumed under the complexity concept. Hall contends that complexity is a three dimensional concept. These three dimensions refer to: horizontal differentiation, vertical or hierarchical differentiation and spacial dispersion.
The present study follows the distinction between structural differentiation and complexity which Dewar and Hage (1978, p. 111) delineate in their study. Structural differentiation has been mainly indicated by job titles, number of departments (Blau and Schoenherr, 1971, p. 116) and the number of levels in Meyer's (1968) work. The major indicators of complexity refer to the number of occupational specialties, the professional activity and the professional training (Hage and Aiken, 1967, pp. 79-80). It seems that structural differentiation is more closer to the formal structure of organization depicted in organizational charts, while complexity taps aspects of knowledge or expertise.

Etzioni (1975, p. 455) discusses complexity in the sense of division of labor within the organization. Although Etzioni does not explicitly distinguish between complexity and structural differentiation, it seems that he accepts as indicators of complexity those that the present study classifies as measures of structural differentiation. For instance, Etzioni (1975, p. 455) referring to a study by Hall, Haas and Johnson (1967b) notes the association between compliance types and complexity found in their study. The latter study uses five indicators of complexity: (1) number of subdivisions; (2) number of major activities; (3) number of major divisions (horizontal complexity); (4) mean number of hierarchical levels and (5) number of levels "in most specialized single department." The lack of emphasis on knowledge or expertise is apparent in these indicators.

Complexity according to Etzioni (1975, p. 456) can be classified among the compliance correlates. Coercive organizations are the least
complex since they rely on force. Utilitarian organizations are the most complex due to their rational orientation and emphasis on efficiency. Normative organizations may range in complexity from low (e.g. social movements) to high (e.g. Orthodox Church).

The present study will adopt the term structural differentiation instead of complexity. This distinction becomes necessary since the indicators that this study is going to use refer mostly to the concept of structural differentiation rather than complexity as conceptualized above. On the other hand, the relationship between size and structural differentiation in the organizational literature is more straightforward than between size and complexity (Dewar and Hage, 1978, p. 111). In our judgement this is another consideration that has to be taken into account for a more sound theoretical grounding of the causal model to be developed.

Scope Scope is one aspect of the organization's "articulation" with its environment. Especially, scope and pervasiveness are, according to Etzioni (1975, p. 255), two alternative ways of the organizational "penetration" into the environment. Scope refers to the extent that organizational participants are jointly involved in organizational activities.

Organizations differ in their scope. In organizations "broad" in scope participants share many activities. Organizations in which participants share few activities are typically "narrow" in scope. Activities may vary from instrumental to expressive, depending on the type of organization. Utilitarian organizations emphasize more
instrumental activities, while normative organizations such as social clubs focus more on expressive activities (Etzioni, 1975, pp. 264-265).

Activities in which participants of an organization engage may be limited to participants of the same organization or involve nonparticipants as well. Scope is determined by examining the extent of involvement in both cases.

**Pervasiveness** Besides scope, pervasiveness represents the second mode of organizational "penetration" into the environment (Etzioni, 1975, p. 255). However, scope and pervasiveness are two analytically independent concepts. Scope refers to "the action boundaries" set by an organization for its members while "pervasiveness" refers to the "normative boundaries." Pervasiveness may be more or less encompassing than organizational scope. So scope and pervasiveness are not necessarily co-extensive. Prisons are organizations with high scope and low pervasiveness; churches exemplify low scope and high pervasiveness. It is further noted that the range of pervasiveness is determined by the number of activities in or outside the organization for which the organization sets norms (Etzioni, 1975, p. 267). Pervasiveness further differs from consensus since it refers to the range of activities for which the organization sets norms whereas consensus refers to the degree to which these norms are accepted by lower participants (Etzioni, 1975, p. 267).

In short, typically utilitarian organizations are narrow in both scope and pervasiveness. The more coercive utilitarian organizations are, the broader their scope and the higher their pervasiveness; it is also expected that the more normative utilitarian organizations are, the
higher their pervasiveness tends to be. Normative organizations are on the average comparatively high in pervasiveness though they range from narrow to broad in scope. The less typical normative organizations are less pervasive, though more so than coercive or utilitarian types. Coercive organizations tend to be broad in scope and low in pervasiveness (Etzioni, 1975, pp. 271-275).

Socialization  Etzioni borrows from Parsons (1951) in defining socialization. The concept refers to "the acquisition of the requisite orientation for satisfactory functioning in a role."

The amount of socialization required by organizations is a function of the degree to which organizational behavior differs from behavior the participants learned elsewhere. Etzioni (1975, pp. 246-250) distinguishes between formal socialization by office holders and informal socialization by lower participants. Formal socialization is instrumental in nature and attempts to technically train the work force as well as to orient them into the company's environment. Formal socialization in utilitarian organizations is more extensive than in coercive organizations. Expressive socialization in utilitarian organizations is limited. Utilitarian organizations rely primarily on external units for both instrumental (e.g. vocational training) and expressive (e.g. motivation to work) socialization. In contrast, normative organizations do not as a rule delegate socialization to external units. However, they exhibit the greater emphasis on socialization. Depending on the situation, the emphasis on expressive and instrumental elements varies.
Communication

Communication refers to "a symbolic process by which the orientations of lower participants to the organization are reinforced or changed" (Etzioni, 1975, p. 241).

Etzioni is concerned with two aspects of communication. In terms of kind he distinguishes between instrumental and expressive communication. In terms of the direction of flow, communication may be either vertical (upward or downward) or horizontal. The instrumental communication carries information and knowledge and modifies cognitive orientations, while expressive communication changes or reinforces values, norms and attitudes.

The form taken by communication networks in the three types of organization are quite similar to their elite structures (Etzioni, 1975, pp. 243-245). There is little instrumental upward communication or downward expressive communication in coercive organizations. However, they exhibit a great deal of horizontal expressive communication. Expressive communication is also of key importance for the effective performance of normative organizations, while instrumental communication is limited. The rational orientation that characterizes primarily utilitarian organizations requires more emphasis on instrumental than expressive communication in both upward and downward directions. In short, the amount of communication of each kind and the direction of flow are central determinants of organizational effectiveness.

Salience

Salience reflects the relative degree of emotional attachment of both lower and higher participants to their organization compared to that in another. In this respect, salience is different from
the alienation or intensity of commitment an individual may feel for the organization to which he/she belongs. The emphasis is on the importance of the involvement of individual in one collectivity compared to his/her involvement in others (Etzioni, 1975, p. 265). According to Etzioni, expressive collectivities are higher in salience such as families than instrumental ones such as utilitarian organizations.

Tension Etzioni used this concept to refer to the personal role tension or emotional role strain created by participating in activities in an organization (Etzioni, 1975, pp. 266 and 390-391).

Output variables

Organizational effectiveness The interest and concern about "organizational effectiveness," especially problems of conceptualization and measurement, have plagued organizational researchers for decades (Katz and Kahn, 1966; Yuchtman and Seashore, 1967; Goodman et al., 1977). The following excerpt from Cameron (1978, p. 604) summarizes the present "state of the art" relevant to organizational effectiveness and also reflects the major trends and orientations that typify a wealth of divergent findings:

In short, organizational effectiveness may be typified as being mutable (composed of different criteria at different life stages), comprehensive (including a multiplicity of dimensions), transpositive (altering relevant criteria when different levels of analysis are used), and complex (having nonparsimonious relationships among dimensions).

The various approaches to effectiveness are categorized by Cameron (1978) under three general headings: the goal approach, the systems-resource approach and the internal organizational processes approach.
Their common denominator is that they primarily address organizational aspects of effectiveness.

"Output" and "goal" accomplishment appears to be one of the most frequently used criteria of organizational effectiveness. This approach in conceptualizing and measuring organizational effectiveness is mainly typified in the work of Georgopoulos and Tannenbaum (1957). Other authors include derivatives of this approach as they approach organizational effectiveness (Ghorpade, 1970; Price, 1968). Yuchtman and Seashore (1967, p. 891) classifying existing approaches to organizational effectiveness, further explicated the "goal approach" into the "prescribed goal" approach and the "derived goal" approach. The former includes stated goals which may appear in a formal charter or may be articulated by top administrative personnel. The latter involves formulated, actual or, according to Perrow (1961) operative goals. Yuchtman and Seashore (1967) refer to this latter strategy as a "functional approach" to effectiveness under which the Parsonian model can be classified. In the Parsonian (1956) framework the functional imperatives (i.e. adaptation, goal-attainment, integration and latency) are frequently posited as dimensions of organizational effectiveness. Organizational effectiveness is assessed on external criteria based on the way that an organization contributes to suprasystems and ultimately to society (Yuchtman and Seashore, 1967, p. 896). Evers (1973, 1979) and Warren et al. (1975a,b) have included the Parsonian functional imperatives in their analysis of cooperative organizational effectiveness. Finally, Ghorpade (1970) classifies goal attainment as the "rational" model of
organizational effectiveness which distinguishes from the "social systems" model. The latter measures effectiveness in terms of adaptability.

Various authors have indicated the problems associated by utilizing goal accomplishment as the criterion for effectiveness. Pfeffer (1977, p. 138) notes that inferring organizational goals from their action is both scientifically unproductive and practically impossible. Hannan and Freeman (1977, p. 131) view the conceptualization and measurement of organizational goals as two basic problems. These problems include the lack in specificity of most organizational goals regarding the weighting of multiple goals and the weighting of short-run versus long-run payoffs. Others view as a major inherent problem of this approach the indeterminacy of organizational goals (Yuchtman and Seashore, 1967). Scott (1977, p. 89) notes the political and normative character of using goals as the criteria of effectiveness and the divergence of various measures. However, he suggests narrowing the scope of interest by relating specific measures of effectiveness to specific features of organizations or systems of organizations. Finally, Etzioni (1975, p. 122) views goals as poor explanatory variables.

The system resource model or the natural systems approach has been suggested as one alternative to the goal model (Yuchtman and Seashore, 1967). The emphasis in this approach is centered around the interaction of the organization and its environment. Organizational success is tantamount to securing organizational inputs and extracting resources from the environment. According to Yuchtman and Seashore (1967, p. 898), effectiveness becomes the "ability of the organization in either relative
or absolute terms to exploit its environment in the acquisition of scarce
and valued resources."

Price (1972, p. 10) argues that under this approach it is not pos­
sible to distinguish between efficiency and effectiveness. Molnar and
Rogers (1976, p. 411) maintain that this approach is inappropriate when
considering nonprofit organizations, and Hall (1977, p. 91) notes the
difficulty in distinguishing between the system-resource approach and the
goal approach, especially when operative goals are considered. Champion
(1975, p. 94) also endorses the idea that by defining the objective of
an organization as the acquisition of scarce resources, it seems that
little progress has been made beyond the goal approach. More recently,
Scott (1977, p. 85) challenges the underlying assumption of this approach
that input acquisition is the only critical aspect of organization, and
argues that it is more biased towards the organizational elite's view­
points and is rather a narrow approach.

The final approach focuses on internal organizational processes as
the core aspect of effectiveness. Pfeffer (1977, p. 144) approaches
organizational effectiveness from the point of view of a process by
which the organizations articulate preferences of various groups and
interests, perceive demands facing them, and make decisions. Steers
also (1977, p. 7) has stated that many problems are minimized by viewing
effectiveness as a process and not as an end state.

Among the main criticisms leveled against the latter approach is
the contention that gathering process data is costly (Scott, 1977),
while focus on means implies neglect of ends (Campbell, 1977).
Etzioni (1975, pp. 132-133) conceptualizes effectiveness by recognizing systemic needs projected in the long run rather than within a short time perspective. Furthermore, he advocates the study of "actual" and not "stated" organizational goals. He approaches organizational effectiveness "not merely as a level of goal realization, but as a pattern of relationships among the elements of an organizational system which enhances its service of one or more goals."

Etzioni (1975, p. 133) draws distinctions between the "goal model," the "systems model," and the "mobilized system model." He recognizes that systems models of organizations are broad in scope to include the concepts of goals, but not the other way around. Etzioni (1975, p. 134) discards the goal model among other things also for the cultural nature of goals (normative standards), which contrasts with the "actual" nature of social systems. According to Etzioni, the systemic model addresses a set of goals. It recognizes basic functional requirements such as goal attainment, integration, tension management etc. and assigned equal weights to them. Etzioni reserves the term "survival model" for the above assumptions. He notes that the majority of functionalists fall within this type of systemic notion.

Etzioni (1975, pp. 135-136) seems to abide more with what he calls "the mobilized system model." Here organizations are treated as systemic entities emphasizing more goal attainment than integration or some other functional alternative. The focus is not so much on the devotion of the organization to its goals as on an "optimal" distribution of organizational resources using as a guiding rule the actual goals the
organization attempts to attain. Etzioni (1975, pp. 136-138) abides with what he calls a "mobilized effectiveness" model. The term "mobilized" denotes the servitude of "actual goals" and especially the dominance of goal attainment over the rest of the organizational goals. Integration, tension management or some other organizational subsystem is treated as "instrumental to goal attainment." "Effectiveness" encompasses in its domain the concept of functional alternatives, the possibility of choice among these and the option to evaluate where the organization is headed as a system. In short, it seems that inherent in Etzioni's "mobilized effectiveness" model is a pressing need for "guideability." Etzioni puts primary emphasis on goal attainment, but he also focus on the intent to accept rational elements for guidance in his "system" notion.

In regard to the above discussion, the present study has chosen to emphasize effectiveness indicators that mostly reflect the goal attainment aspect of farmer cooperatives. In the discussion of output effectiveness as a major conceptual area of the cooperative effectiveness model, it was indicated that in this respect previous work by Evers, Warren and Rogers (1973) and Warren, Rogers and Evers (1975b) has delineated productivity as the corresponding organizational output. Productivity refers to "the ability to obtain a high volume of business" (Evers, 1979, p. 89).

Manager's role performance will be another way to approach organizational effectiveness. This follows Katz and Kahn's (1966) argument that the "dynamic relationship between individual behavior and organizational effectiveness has been largely ignored" (Evers, 1979, p. 91). In
fact, in management sciences as well as in the organizational literature the assumption is implicit that an effective organization is largely based on an effective manager. It seems that also Etzioni (1975, p. 148) does not deny to a certain degree the interplay between individual and organizational effectiveness.

A causal model of organizational effectiveness

Using Etzioni's compliance correlates as the basic underpinning, a causal model of organizational effectiveness is developed. The purpose of this research is to build upon and extend previous fruitful analyses of the compliance model.

The cooperative organizational effectiveness theoretical model for utilitarian organizations has been discussed and presented by Warren et al. (1976). A conceptual model on organizational effectiveness in normative organizations has been conceptualized and tested by Mulford et al. (1972). Finally, Aziz (1978), benefitting from both the above sources, and especially Warren et al. (1976) whose model and set of data he used, compared the Error-in Variables procedure with the Least-Square procedure. He also introduced size as a control variable in his cooperative effectiveness model. Finally, Evers (1979), employing a systems framework, developed and tested a structural equation model with unobserved variables on cooperative organizational effectiveness, using Joreskog's confirmatory factor analytic approach (LISREL III and IV).

The present study, although it uses the basic compliance correlates included in the above models, attempts to reorder the causal sequence of
certain variables according to Etzioni's (1975) most recent suggestions. Furthermore, some additional external factors are included besides size, the relationship of which to the compliance correlates and overall contribution to the effectiveness model will be assessed. Although Etzioni (1975, pp. 394-395 and 407) did not originally assume causality for his propositions, he has accepted the preliminary causal model developed in the Iowa State Compliance Studies. Etzioni originally developed the compliance theory from a systems perspective, but he views ample opportunities in hypothesizing sequences.

The causal ordering of the variables is diagrammed in Figure 2. The postulated causal relations among the variables of the system are represented by unidirectional arrows extending from each determining variable to each variable dependent on it. The solid lines indicate relationships that have received the theoretical attention of Etzioni. Dotted lines indicate relationships that have been in addition hypothesized and/or received empirical support in the series of compliance studies in Iowa State University. Dashed lines indicate the propositions introduced by the present study in the causal model of cooperative organizational effectiveness.

Five variables: selectivity, consensus, competition, market potential and size logically precede all other variables in the causal ordering. These five variables are not viewed as causally interrelated in the model. This is represented in Figure 2 by the curved, double-headed arrows.
Residual variables are also represented by unidirectional arrows leading from the residual variable to the dependent variable. Literal subscripts are attached to residual symbols to indicate that these variables are not measured. Finally, the quantities entered beside the arrows on a path diagram are the symbolic or numerical values of the path and correlation coefficients of the postulated causal and correlational relationships. The symbolic form of the path coefficient, is $p_{ij}$, where the first subscript $i$ denotes the dependent variable and the second subscript $j$ denotes the variables whose determining influence is under consideration. Note that the diagram allows for only one-way causation. Hence, a recursive model is formulated. So, the coefficients $p_{ij}$ and $p_{ji}$ will not appear in the same path diagram together.

The present study provides a test of the following propositions developed by Etzioni (1964, 1975) in his compliance theory.

**Proposition 1:** An organization that is highly selective of its members is more likely to be more effective than an organization with few, if any, criteria for membership

**Proposition 2:** The higher the scope in an organization, the higher its organizational effectiveness

**Proposition 3:** The higher the pervasiveness in an organization, the higher its effectiveness

**Proposition 4:** The higher the communication in an organization, the higher its effectiveness

**Proposition 5:** The higher the degree of tension in an organizational participant, the lower the organizational effectiveness

**Proposition 6:** The higher the salience of an organization to its participants, the lower the organizational effectiveness
Proposition 7: The higher the salience of an organization to its participants, the higher their tension.

Proposition 8: The higher the socialization the higher the organizational effectiveness will be.

As the causal model is developed some additional propositions suggested in the Iowa State Compliance Studies as well as the new propositions introduced by this study will be presented.

In the causal model to be developed, the present study has reconsidered the causal sequence of selectivity, scope and pervasiveness to that of socialization and communication relative to the past Iowa State Compliance Studies. In short, Etzioni (1975, p. 410) suggests a possible reordering of the causal sequence of the compliance variables. He argues that mainly scope, but also pervasiveness and selectivity might be beneficial as "exogeneous variables"1 to determine the amount of intra-organizational socialization and communication rather than the other way around. Especially, Etzioni points out that selectivity substantiates one of the fundamental conditions of organizational life, the extent to which an organization can make a choice between potential members. Although scope seems to be of equal importance to selectivity in the general framework of the compliance theory, according to Etzioni (1975, p. 410) selectivity is expected to "dominate the intra-organizational

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1Etzioni uses the term "exogenous variables" in the sense that although he recognizes that environmental factors can influence the relative effectiveness of the organization, he has preferred to emphasize compliance and its correlates in his theory.
constellation of factors in utilitarian organizations." Hence, in the reformulated model, selectivity assumes the role of an exogenous variable and a relationship is hypothesized between selectivity on the one hand, scope and pervasiveness on the other. Human resources that are secured through selectivity from the environment are deemed as a vital input (Azumi, 1972, p. 93) with potential implications for organizational structure and processes (Azumi and Hage, 1972, p. 100). The present study assumes that selectivity has a direct bearing upon the action boundaries (scope) and normative boundaries (pervasiveness) set by the organization. The theoretical rationale for positive links between selectivity on the one hand, scope and pervasiveness on the other, has also been provided by Warren et al. (1976, p. 316). Selectivity was causally linked to scope, since in utilitarian organizations participants are more probably to be selected because they will "fit in well" with other participants. Furthermore, internalization of organizational norms is more enhanced when participants are recruited under more demanding criteria. Both relationships received empirical support (Warren et al., 1976, p. 243). Hence, the following propositions are suggested.

**Proposition 9:** An organization that is highly selective of its members is more likely to be more pervasive than an organization with few, if any, criteria for membership

**Proposition 10:** An organization that is highly selective of its members is more likely to be more broad in scope than an organization with few, if any, criteria for membership

**Proposition 11:** The higher the pervasiveness of an organization, the greater its emphasis on socialization.
Proposition 12: The broader the scope of an organization, the greater its emphasis on socialization.

Proposition 13: The broader the scope of an organization, the greater its emphasis on communication.

Etzioni (1975) further reasons that scope and pervasiveness are positively related. Warren et al. (1976, p. 336) hypothesized scope as an antecedent of pervasiveness. They suggest that more intensive interaction in terms of breadth and frequency promotes acceptance of organizational norms. So, in addition, the following proposition is stated.

Proposition 14: The broader the scope of an organization, the higher its pervasiveness.

Consensus is a variable which has drawn the attention of students of organizations. Price (1968, p. 44), interpreting available organizational research, comes up with the suggestion that a high degree of consensus is functional to organizational effectiveness. Scott (1977, p. 70) suggests that consensus is a variable of interest for organizations since it may account for important differences in organizational effectiveness. Furthermore, Mulford et al. (1973) note that consensus formation should be more strongly related to role performance of elites than of other members.

Etzioni (1975) also asserts a positive relationship between consensus and organizational effectiveness. However, Etzioni (1975, pp. 399-401) treats consensus as an intervening variable between socialization, communication and selectivity on the one hand and effectiveness on the other. In his conceptualization, consensus refers to different status groups within the organization, namely organizational representatives and lower participants.
The present study emphasizes, rather, the horizontal aspects of the concept, namely, the consensus between farm coop managers and board of directors. These two organizational positions are of almost equal status as both belong to the organizational representatives. In this context, the role of consensus is conceptualized as that of an exogenous variable other than an intervening variable. Consensus among organizational elites is treated as a necessary input although not sufficient enough to enhance organizational pervasiveness. Ideas and symbols have been conceptualized as a form of technological input (Champion, 1975, p. 101). It is expected that similarity of ideas and strategies among organizational representatives is an important factor in promoting the throughput transformation processes in the organization. Especially, it has been pointed out that interaction of people are "raw materials" to be manipulated by administrators in organizations (Perrow, 1967, p. 195). Since compliance variables refer to lower participants in the organization, the present study perceives them as resources to be potentially transformed. Consensus of organizational representatives regarding the perceived nature of these resources is hypothesized to enhance control over them and efficiency in transformation by setting appropriate normative prescriptions for the range of activities of lower participants. Some indications for the exogenous role of consensus may be further drawn from Thompson and Tuden's (1959) study. Although they found support for a causal relationship between control structure and member consensus, the authors, contiously interpreting their findings, note that not only may the system of control determine member consensus, but the nature and
extent of member consensus may also condition the type of organizational control (Thompson and Tuden, 1959, pp. 195-206). Finally, according to Price (1968, p. 106) lack of consensus even within the board of directors may be dysfunctional to organizational effectiveness. Hence, the following two hypotheses are suggested:

Proposition 15: The higher the consensus among organizational representatives, the higher the organizational pervasiveness.

Proposition 16: The higher the consensus among organizational representatives, the higher the organizational effectiveness.

Competition is an aspect of the organization's environment rather than an internal aspect of organizational structure. Champion (1975, p. 55) as well as Perrow (1970, pp. 124-127) point out that a competitive environment is more conducive to organizational change than a non-competitive environment. Azumi (1972, p. 98) also asserts that competition is a source of uncertainty or turbulence in the organization's environment which the organization attempts more or less successfully to stabilize. It is probably due to this nature of competitive environment forces that in the past, farmer cooperatives which are facing threats for their survival tend to merge (Ryan, 1970, p. 1). Furthermore, Pfeffer and Leblebici (1973, p. 273) develop the argument that external pressures on an organization under conditions of competition lead to a "demand" for even more an interlocking of organizational behaviors and more coordination and control within the organization. However, their hypothesis that the more competitive the organization's environment the more levels there will be in the organizational hierarchy was weakly
supported. Finally, Khandwalla (1977, pp. 394-395) suggests that the more competitive the external environment of an organization is, the more likely are avoidance mechanisms like market research, advertising or forecasting to be employed by the organization. Hence, by increasing the number of positions and specialties within the organization, differentiation of internal structure becomes unavoidable (Blau, 1970, p. 213).

From the above discussion the following proposition emerges.

**Proposition 17:** The higher the competition in the organization's environment, the higher its structural differentiation.

The increasing requirements for interlocking organizational behaviors and more coordination and control within the organization under conditions of competition has been explicitly or implicitly suggested (Pfeffer and Leblebici, 1973; Rose, 1955; Weick, 1969). In addition, in their study Simpson and Gulley (1962) validated the hypothesis that organizations with the widest range of pressures will tend to score high in emphasis on membership involvement in organizational activities.

It is also contended that under conditions of competition a mechanism of organizational control is the process of specifying decision procedures in advance of the decision situation (Pfeffer and Leblebici, 1973). By setting normative standards over decision procedures and activities, control over decision outcomes is enhanced. Furthermore, we expect that normative prescriptions regarding technical aspects of production standards and sales procedures will increase as competition increases. Coalitions and mergers, in fact, involve new agreements among firms which necessitate the establishment of new norms controlling their
relationships and standardizing the procedures of their working together. Based on these arguments, two propositions emerge.

**Proposition 18:** The higher the competition in the organization's environment, the higher its scope.

**Proposition 19:** The higher the competition in the organization's environment, the higher its pervasiveness.

Organizational fields or markets represent an important aspect of the organization's environment (Azumi and Hage, 1972, p. 33). Burns and Stalker (1961, pp. 1-10) found formalization—an aspect of the structure of organization—to be negatively associated with financial success in uncertain environments. Lawrence and Lorsch (1967), along with the rest of the so called contingency theorists (Burns and Stalker, 1961; Thompson, 1967), have also considered the role of market environment for determining internal organizational structures and processes. For instance, Lawrence and Lorsch (1967, p. 10) showed in their study that the organization operates within a number of subenvironments (market, science and technical—economic). Depending on the certainty of these subenvironments, the particular subsystem of the organization (fundamental research, applied research, sales and production) changes its structure. Finally, Pfeffer and Leblebici (1973, p. 272), interpreting Thompson (1967) point out that as the number of products and hence probably the number of markets increases, there will be more horizontal differentiation or more departments in the organization. Hence, the following proposition is suggested.

**Proposition 20:** The higher the market potential for an organization, the higher its structural differentiation.
The present study reasons a positive relationship between market potential and organizational effectiveness, as primarily indicated by the economic criteria of net operating revenue and savings. It is expected that enhanced potential for sales in the market is a major factor in shaping higher net operating revenue and savings. Scott (1977, p. 79) has suggested the consideration that outcome measures will be influenced by the relation between the organization and its market environment, which means that "indicators of outcomes" relating to sales for products will reflect, besides other things, market conditions also. Considering the above, the following proposition is suggested.

Proposition 21: The higher the market potential of an organization, the higher its effectiveness.

A sizeable number of studies (Pugh et al., 1968; Blau, 1972; Child, 1972; Meyer, 1972) has indicated a positive relationship between the size of an organization and its structural differentiation. In his formal theory of differentiation, Blau (1970) assigns to size the role of a key independent variable. Pugh et al. (1969) indicated that size was one of the more crucial factors for determining organizational structure. Meyer (1968) found size correlated positively with both the number of levels in the hierarchy and the number of divisions. The importance of the size variable was reemphasized in a longitudinal analysis conducted by Meyer (1972). Finally, Blau and Schoenherr (1971) maintain that size is the major factor in determining organizational structure. However, some other findings show a small relationship between size and the perceived degree of bureaucratization (Hall and Title, 1966). Generally the proposition suggested from the above discussion is:
Proposition 22: The higher the size of the organization, the higher its structural differentiation.

Scope and pervasiveness were found to be significantly and positively related to both measures of size by Warren et al. (1976, p. 342). The number of employees was more highly correlated with scope and pervasiveness than assets as an indicator of size. Size is reasoned to enhance internalization of organizational norms among individuals, since larger organizations rather than small organizations are more likely the outcome of successful growth and therefore create a positive image among their participants. Furthermore, the utilitarian nature of the organizations studied implies that internalization of organizational norms will be functional for the organization and its efficiency, and hence more positive rewards in terms of money may accrue to its members. The above discussion leads to the formulation of the following two propositions.

Proposition 23: The higher the size of an organization, the higher its scope.

Proposition 24: The higher the size of an organization, the higher its pervasiveness.

As organizations grow in size and complexity, the issue of coordination becomes more problematic. Azumi and Hage (1972, p. 311) note that theoretically the problem of coordination and integration becomes more apparent with the extent of differentiation in organizations. Coordination denotes integration between departments and/or occupations and the various devices used to interrelate and reconcile the parts of an organization. March and Simon (1958, pp. 158-169) suggest two basic ways in which organizations can be coordinated: feedback and plan. Building on the work of March and Simon, James Thompson (1967, pp. 55-56) extends
the discussion on types of coordination. Hage et al. (1972, p. 371), integrating these approaches, delineates two types of linkage mechanisms in organizations: linkages through preestablished rules and routines and linkages through the transmission of new information, that is coordination through feedback or mutual adjustment. As they point out, the latter form of coordination relies more on socialization. In other words, Hage et al. see socialization and communication as means of handling problems of coordination in complex organizations. Similarly Etzioni (1975, p. 241) notes the importance of communication network and relevant roles and mechanisms associated with the flow of communication under conditions of increasing organizational complexity. Finally, Blau and Schoenherr's work (1971, pp. 311-329) based on research into governmental finance and public personnel agencies, found that increased complexity engenders problems of communication and coordination. Personnel in the managerial hierarchy spend more time in dealing with these problems than in direct supervision in a highly complex organization.

Two propositions emerge from the discussions.

Proposition 25: The higher the degree of structural differentiation in the organization, the higher the socialization of its members.

Proposition 26: The higher the degree of structural differentiation in the organization, the higher the communication.

It has been maintained that the nature and complexity of the hierarchy of authority is one among the primary considerations for

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¹It is noted that the term complexity in Hage's et al. discussion is not identical to structural differentiation as used in this study. But it seems close enough for comparability.
organizational effectiveness (Champion, 1975, p. 196). Price (1968, p. 24) also postulates that organizations which have a high degree of specialized departmentalization are more likely to have a high degree of effectiveness than organizations which have a low degree of specialized departmentalization. In their significant study "Organization and Environment" Lawrence and Lorsch (1967), examining the consequences of differentiation in the plastic industry, found that the more effective organizations are those with the highest degree of differentiation. Their effectiveness in the face of high differentiation is explained by their successful conflict resolution. In the case of agricultural cooperatives the successful impact of structural differentiation on effectiveness might be thought to be enhanced through successful socialization and communication mechanisms mitigating the conflict potential. Thereby, the proposition is as follows.

Proposition 27: The higher the structural differentiation in the organization, the higher its effectiveness.

The present study further hypothesizes a causal link between socialization and communication. Socialization is hypothesized to precede communication and affect its flow. Etzioni (1975, p. 246) has pointed out that, unlike communication, concern for socialization increases before or shortly after new participants join the organization, especially when attempts to promote consensus between newcomers and the rest of the organization are comparatively intensive. Through socialization mechanisms the existing consensus structure and communication practices are transferred to new generations of participants (Etzioni, 1975, p. 252). Hence we hypothesize that:
Proposition 28: The higher the degree of socialization in the organization, the higher its degree of communication.

The last two propositions suggested in the present study indicate a positive causal relationship between socialization and salience on the one hand, and between communication and salience on the other. It is expected that the successful socialization experiences of the incoming organizational participants, combined with the presence of appropriate communication channels, enhance the identification of the participant with the organization and his job satisfaction. Fournet et al. (1966, p. 173) note that communication is a vital element in job satisfaction and higher morale. Lack of communication tends to be a major source of dissatisfaction. Furthermore, Porter et al. (1975, p. 178) point out the existence of overwhelming evidence suggesting that the initial phase of the employment period is quite important to the development of a healthy relationship between the individual and the organization. Orientation programs and job instructions are instruments for the organization aimed at improving the probability of successful individual adaptation. Gomersall and Myers' (1966, pp. 67-70) study found that these socialization practices are more successful if they direct attention toward the definition of situation, as perceived by the newcomer. These authors utilized one-day anxiety reduction sessions. According to their view, a significant effect of the new orientation program that they followed, was the encouragement of upward communication. Hence, the two final propositions suggested are:
Proposition 29: The higher the degree of socialization in an organization, the higher the salience for its lower participants.

Proposition 30: The higher the degree of communication in an organization, the higher the salience for its lower participants.

So far 30 propositions have been suggested. They are all interrelated; thus, they consist a model of organizational effectiveness.

For brevity, the following notations are employed in Figure 2.

\begin{align*}
\text{CONS} &= \text{Elite Consensus} \quad (X_1) \\
\text{SELT} &= \text{Selectivity} \quad (X_2) \\
\text{COMP} &= \text{Competition} \quad (X_3) \\
\text{MKPT} &= \text{Market Potential} \quad (X_4) \\
\text{SIZE} &= \text{Size} \quad (X_5) \\
\text{STRD} &= \text{Structural Differentiation} \quad (X_6) \\
\text{SCOP} &= \text{Scope} \quad (X_7) \\
\text{PERV} &= \text{Pervasiveness} \quad (X_8) \\
\text{SOCL} &= \text{Socialization} \quad (X_9) \\
\text{COMM} &= \text{Communication} \quad (X_{10}) \\
\text{SALT} &= \text{Salience} \quad (X_{11}) \\
\text{TENT} &= \text{Tension} \quad (X_{12}) \\
\text{PERT} &= \text{Role Performance} \quad (X_{13}) \\
\text{NSAV} &= \text{Net Savings} \quad (X_{14}) \\
\text{NORT} &= \text{Net Operating Revenue} \quad (X_{15}) \\
U_{q...g} &= \text{Residual Terms} 
\end{align*}
--- = Causal relationship (Etzioni's original proposition)

---- = Causal relationship (Propositions developed in the Iowa State University Compliance Studies)

-- = Causal relationship (Proposition the present study introduces.)
*i = 13,14,15 for role performance, net saving and net operating revenue respectively.

Figure 2. A causal model of effectiveness
CHAPTER 3.

METHODS

Introduction

This chapter has several objectives. First, it attempts to describe the data sources, the population, the sample, the data collection techniques, the unit of analysis and the measurement of variables. Second, it provides a cursory review of structural equation models as well as the application of causal modeling techniques in sociological measurement, especially for the estimation of measurement error and reliability. Third, the Least-Squares approach, the errors-in-variables technique and Joreskog's (1969) model of linear structural relations (LISREL) are discussed. In addition, the estimation of measurement errors and quality of the composite measures used in the present study are presented. Finally, the theoretical propositions of the model are translated into empirical hypotheses.

Data sources

The data utilized in this dissertation were collected as part of a larger project titled "The Managerial Success Study of 1971," conducted by the Department of Sociology and Anthropology at Iowa State University under Project No. 1915 of the Iowa State University Agricultural and Home Economics Experiment Station. The study was further under the auspices of the Farm Cooperative Service (U.S.D.A.). A team of Iowa State sociologists from the Department of Sociology and Anthropology, Drs. Richard Warren, George M. Beal and Joe M. Bohlen, served as project co-directors.
The study originally focused on various aspects of cooperative managers that lead to a successful cooperative business. However, the emphasis from the individual level of analysis gradually shifted to the organizational level, with focus primarily on organizational effectiveness.

Population and sample

The population frame used for this research included the farmer grain cooperatives in Iowa. In a more general sense, the population may be thought of as quite larger since, according to Evers et al. (1976, p. 332), many local farmer cooperatives share some features with all local retail businesses which may also comprise elements of the population.

The total population of farmer cooperatives in Iowa numbered 249. After application of five eligibility criteria for selecting the sample under consideration, the number of cooperatives was reduced to 175. The aforementioned eligibility criteria (Warren et al., 1973, pp. 9-10) stipulated the following:

1. That only bona fide patron-member cooperatives be counted: this means that a firm is considered a cooperative if at least 51 percent of its business is with members customers.

2. That the manager have occupied their present positions for at least two years: this restriction thus assures a minimum time span so that the manager's impact is part of the general functioning of the cooperative business.

3. That all branch plant operations be excluded: in this way the focus of the study was on the importance of top administrative positions which are associated with central plants and not on subordinate branch plant managers.

4. That the managers should not have been part of a similar previous study: in this way managers in a previously-conducted pilot study in 1966 were excluded to avoid probable biases resulting from previous interviewing.
5. That the cooperatives have at least 25 percent of its gross sales in grain: this criterion increases the homogeneity of the sample and also considers the fact that Iowa's agriculture is mainly grain oriented.

The final sample included 153 general managers of local farm supply and grain cooperatives. Eligibility criteria and completeness of information obtained account for this reduction of the original population.

It is evident that the above sampling procedure does not guarantee that a random sample of farmer cooperatives in Iowa was drawn. However, drawing purposive samples is not an uncommon procedure among researchers of organizational behavior. Organizational populations are not easily defined. Furthermore, the various costs involved in conducting large-scale survey sampling of these organizations is a further inhibitive factor in this kind of research endeavor. Considering the above problems and limitations, Evers et al. (1976, p. 332) suggest that the researcher in this case must be cautious in interpreting his data and making inferences.

Data collection techniques and unit of analysis

Both interview schedules and questionnaires were used in gathering data from the cooperative managers. In addition, secondary sources of information such as business records or census data were used to obtain information for participants in the local cooperative as well as for its social and economic environment. Census data were especially used to provide information on agricultural production and community population.
Based on the conceptualization of the variables, specific measures were developed for each concept of interest. Details about each variable and its operationalization will be given in this chapter after first discussing some general measurement considerations.

Both managers and the farmer cooperatives were used as the unit of analysis. Responses given by the top level managerial personnel were used in developing organizational and managerial level indicators. Information from secondary sources supplemented this effort.

**Farmer cooperatives**

A more detailed discussion of cooperatives and especially agricultural cooperatives can be obtained from various sources (Evers, 1979; Bohlen and Beal, 1975; Kravitz, 1974). In the context of the present study, the general description of farmer cooperatives given by Professor Emeritus Marvin Schaars of the University of Wisconsin (Kravitz, 1974, p. 1) is used.

A cooperative is a business voluntarily owned and controlled by its members patrons, and operated by them on a nonprofit or cost basis. It is owned by the people who use it. It is organized and incorporated to engage in economic activities with certain ideals of democracy, social consciousness, and human relations included. As Professor Paul Casselman states, it is "an economic system with a social content."

The agricultural cooperatives examined in this study are farmer cooperatives in that they are organized by the producers themselves. They are of a marketing and supply nature and offer some services to their patron-members (Evers, 1979, p. 65).
Regarding Etzioni's classificatory scheme and farmer cooperatives, Warren, Mulford and Yetley (1976, p. 331) contend that cooperatives as a business firm have a dual nature. They are utilitarian in the sense that they seek profit and use remunerative power as a means of control. They also possess normative elements in that the farmer-owners are committed to service maximization to customers rather than mere profit. Etzioni (1975, p. 392) further recognizes that the utilitarian aspect is the primary nature of farmer cooperatives due to pressures to operate efficiently and economically and suggests a "secondary" status of their normative features.

Measurement of variables: Some general considerations

In the measures developed, data pertaining to employees, the manager and/or director of the local cooperative were included. Both objective sources of information—such as business records—as well as subjective sources—the cooperative manager—were used in providing the relevant information for participants in the local cooperative.

Selection of items used to measure the concepts of our model was based on both theoretical and empirical criteria: That is, Etzioni's conceptual framework was used basically in developing the interview schedules and questionnaires. This was further combined with the criteria of content validity and general factor analysis. The development of the measures used in the present study is based basically on measures previously generated and used within the 1971 study (Warren and Evers, 1974; Warren et al., 1975a; 1975b). However, the variable of
structural differentiation represents a slightly revised measure of the present study from the ones previously used.

Appendix A presents the complete list of items included in each variable composite. The term composite refers to various single item indicators that are used to measure the same concept (Evers, 1979, p. 109). The items of each composite were randomly assigned into two splits--A and B--called subcomposites in the context of the present study.

For each composite, the items were standardized individually and summed to form the composite score. The only exceptions were for the variables of salience, tension, consensus and market potential. These four variables had items with approximately equal variances; hence the variance of each item did not affect the weighting of the items in forming the composites, nor was standardization necessary. Competition was also left unstandardized despite the unequal variances among the items. However, this was done purposely, in order to illustrate some of the potentialities of the LISREL IV computer program and contrast it with the Super Carp computer program. Three sequential steps were followed in standardizing the variables of our model. During the first step the items used as indicators of a specific variable were assigned through a randomization procedure into the aforementioned subcomposites. First, in each specific subcomposite of a given variable each individual item was standardized. The standard score of each item was calculated by subtracting the raw values of each item from its arithmetic mean and dividing by the standard deviation of the respective item. Second, the
average standard score was calculated for each subcomposite and cor-
responding individual respondent after having standardized all items
included in each subcomposite and corresponding individual responses.
The third and final step was also an averaging procedure. The average
standard score for each variable of our model and respective respondent
was calculated by dividing the sum of the calculated standardized sub-
composite scores for each individual by two.

Appendix B presents in a more formalized language the three succes-
sive steps of standardization outlined above.

For subcomposites of variables with approximately equal means and
variances, only steps two and three were followed. This was the case
for the variables of salience, tension, consensus, market potential and
competition. Competition—though having items with unequal variances—
followed the latter process of standardization for reasons mentioned
above.

Selectivity

Selectivity was measured by a 13-item composite which has a
reliability of .780. These items were based on the reported criteria
for determining the number and qualifications of employees needed by the
organization, several characteristics of the manager (economic knowledge,
I.Q., educational level) and his self-reported rank compared with his
peers. It was assumed that these variables reflect some of the criteria
used by the board in selecting a manager.
Elite consensus

Elite consensus was measured by a series of seven items tapping two conceptual areas: two items measured job satisfaction while five items measured board relationships. The resulting composite of 7 items had a reliability coefficient of .743.

Market potential

Three items were used in operationalizing market potential. Data for these measures were taken from the Agricultural Census data of 1969 and 1970. From the Iowa Census data, two-year averages were computed by county for (1) the number of hogs sold, (2) the number of cattle sold and (3) the value of commercially mixed feed. These three indicators were combined into one composite measure of market potential (economic potential, market volume). The coefficient alpha reliability was computed as .980.

Competition

Two aspects of the competitive situation were identified in the preceding chapter, both referring to competition among more or less similar firms. The first of these involves the number of competitors. The manager was asked to indicate how many other businesses with similar product lines were operating in his trade area. He was further asked how many of these were major competitors. The reliability of this composite as given by coefficient alpha is .779.
Organizational size

In this study, organizational size was measured by the number of employees (subcomposite B standardized) and dollar value of fixed assets (subcomposite A standardized). The coefficient of reliability alpha was estimated to be .873.

Structural differentiation

Structural differentiation was measured with a four-item composite, which included the number of positions in the firm, the number of specific areas, the number of levels and the number of heads. A composite resulted from these measures with an alpha coefficient of reliability .741.

Scope

Scope was operationalized by an 11-item composite. Seven items related to the involvement of employees in the decision-making process of the cooperative. The other items related to the degree the manager sought advice on different decisions, the importance of employees on organizational goals, and joint meetings attended by both the manager and one or more board members. The coefficient of reliability alpha was estimated to be .674.

Pervasiveness

An attempt was made to measure both internal and external aspects of organizational pervasiveness by using seven items. Five items involved the extensiveness of codification of work norms. External pervasiveness was tapped with the number of product lines handled and
the membership of the manager in community organizations (Warren et al., 1976, p. 338). The alpha coefficient of reliability was calculated to be .619.

**Socialization**

Six items were used to tap the measure of socialization. These indicators focused mainly on the ideas of training and obtaining information. Some of the items in the socialization composite evaluated the amount of training and job orientation. More specifically, some areas which they referred to concern methods of employee training or the number of management meetings attended. Another conceptual area in the domain of this concept was the orientation of employees regarding cooperative philosophy.

A single composite was formed, based on the summation of the six item scores. The composite has a reliability, as measured by coefficient alpha, of .751.

**Communication**

Communication was measured by a 14-item composite. Nine of the items concerned "the manager's perception of influence of communication on employee production." They are 11-point certainty method questions. Three items secured factual information regarding communication between employers and customers. They were open-ended questions judged through the 99 point certainty method. The remaining items referred to the employees' potential for communicating relevant information to customers and in-fact count days of training and information sources. The
standardized and summed composite measure has a reliability coefficient of .655.

**Salience**

Salience was operationalized by a composite of thirteen items. Most of the items related to the manager's job satisfaction, with the rest dealing with the centrality of the organization to employees. The items were not standardized, so that actual values ranged from 5.99 to 14.29 with an estimate of the reliability coefficient alpha equal to .787.

**Tension**

Tension was determined by a composite of six items. The items examined the difficulty in achieving and pressure to achieve organizational goals of efficiency and productivity. Actual values vary from 2.00 to 9.33. These values represent the sum over all goals of "difficulty" plus "pressure." The reliability coefficient was equal to .600.

**Effectiveness**

Three alternative indicators of organizational effectiveness have been used in the present study. The first indicator of effectiveness reflected what on the surface appeared to be an individual measure of role performance. Certain justification has already been provided as to why organizational effectiveness was indicated by role performance, considering that this study deals with the organizational level of analysis. Role performance of co-op managers was measured by a composite of nine items. Two dimensions of role performance was included in this
composite: (a) the manager's efforts to secure resources from the environment and (b) the manager's attempts to manipulate intraorganizational factors to facilitate goal attainment activity. Various items were used to tap the above two aspects, ranging from the use of field representatives and specialized outside help to items pertaining to decision-making steps and criteria used to run the cooperative efficiently. The manager's recorded verbal responses to each of these questions were randomly presented to judges for scoring, on the basis of performance leading to successful management of retail businesses. For each question the raw scores of the judges were transformed to normal deviates, and an average score for judges was obtained.

The second and third indicators of organizational effectiveness are subsumed under the output of productivity: net operating revenue and savings. Net operating revenue was calculated by taking gross commodity sales minus cost of commodity goods plus service income. A higher net operating revenue is an indication that a business is securing its share of the market potential. This is probably the result of the selection process by customers of a business which offers products and services meeting the demands and needs of its customers. Finally, although the primary goal of agricultural cooperatives is net savings, they do however serve as a subsidiary goal within the goal-attainment structure of cooperatives. Dividends are returned to their patron members through net savings. Also net savings can be used to meet capital needs in terms of facilities and equipment. The net savings for 1969 and 1970 were used as two indicators of this variable. The net savings were calculated by
subtracting expenses from net operating revenue. The variable is in actual dollars.

**Structural equations models**

The development of structural equation models in sociological literature is an attempt to synthesize various psychometric and econometric approaches to structural modeling (Bielby and Hauser, 1977, p. 138).

Various substantive areas have been analyzed in the social and behavioral sciences by using structural equation models. Among sociologists, fruitful application of structural equation models has been made in the area of social stratification. Bielby et al. (1977) utilize models combining econometric and psychometric approaches to structure, such as those developed by Joreskog. Much of this work is attributed to the original development of path analysis techniques by the geneticist Wright (1934). Bielby and Hauser (1977, p. 138) note that Wright anticipated later developments with respect to simultaneity, overidentification and unobserved variables.

Various methodological terms have been coined to refer to the aspect of structural equation models. Among these Joreskog and Sorbom (1978, p. 1) note path analysis, linear causal analysis, dependence analysis, simultaneous equations systems, structural equation models and cross-lagged panel correlation technique.

Heise (1969b, p. 39) distinguishes between two types of mathematical models: "estimation models" and "structural models." He views estimation models as basically descriptive in nature, with their primary goal
the measurement of certain attributes by using one or a combination of indexes. Heise maintains that measurement and estimation models rather ignore theoretical underpinnings, despite the fact that they consider methodological assumptions. Accuracy and efficiency of estimators are the major criteria in assessing the model. On the other hand, Heise argues that structural models bring theoretical considerations and the systemic notion of interdependence among a set of variables. According to Heise (1969b, p. 41) the primary goal here is to define a set of equations which in some sense corresponds to actual causal processes in the real world. The focus is the definition of a causal structure through a set of equations which permit predictions of how changes in one variable of the system might affect the values of other variables in the system. Estimation of path coefficients is quite helpful in this respect. In so doing, theoretical and quantitative considerations are basic aspects in evaluating a structural model. This contrasts with the criteria of efficiency and accuracy that are the basis of evaluation of an estimation model. Finally, Heise notes that the main limitation of these models is that experiment is the main research design for their development. However, he believes that the careful use of longitudinal and cross-sectional data can compensate for this problem.

Regarding path analysis, Land (1969, p. 4) points out that the causal models are written as a set of structural equations that represent the causal processes that are presumed to exist among the variables under consideration. Through proper manipulation of the structural equations in the model the parameters of the model can be estimated, and the whole
model can be evaluated. In Land's view, causal modeling is a tool that sociologists can potentially use to increase the interaction between theory and research. Land (1969, p. 7) uses the term "path model" to refer to the set of structural equations representing the postulated causal relationships among the variables under consideration. He distinguishes the "structural equations" constituting the path model from the "path estimation equations." Parameters of the structural equations are estimated from the path estimation equations. Path analytic principals are used to derive the path estimation equations from the structural equations. Path estimation equations may further help to test the fit of the model to the data.

Bielby and Hauser (1977), in their excellent review of structural equation models, use the terms "causal models," "path analysis" and "structural equation models" interchangeably. They point out that these terms represent methods for modeling the structure of relationships among variables with systems of equations. However, they prefer the term structural equations since it seems free of the need of defining cause in a more restrictive sense. The authors note that a structural equation model specifies the process underlying the joint distribution of a set of observable variables. They also point out that a common idea in the structural equation literature is that structural parameters are "fundamental or invariant." In the same sense, Joreskog and Sorbom (1979, p. 1) emphasize the point that "the structural parameters represent relatively unmixed, invariant and autonomous features of the mechanism that generate the observable variables." They envisage structural
equation models as depicting social reality in terms of cause and effect variables and their indicators. Bielby and Hauser (1977, p. 140) acknowledge that structural equation models have been used to represent a variety of causal systems. However, they point out that their discussion is limited to systems of equations assuming causality in their structure. In this respect, structural models using multivariate analysis in a descriptive capacity for data reduction and decomposition are not discussed. Also, issues of structure emerging in simple equation models (general linear models) are not considered in their review. The authors classify structural equation models into three main categories: first, recursive models in observable variables; second, non-recursive models in observable variables; and third, models with unobservable variables.

Models in observable variables are expressed in matrix notation by the following system of equations

\[ \mathbf{B} y_i = \Gamma x_i + u_i \]  

where
- \( \mathbf{B} \): a matrix of coefficients among dependent variables
- \( y_i \): a vector of dependent (endogenous) variables
- \( \Gamma \): a coefficient matrix between independent (exogenous) and dependent (endogenous) variables
- \( x_i \): a vector of exogenous variables
- \( u_i \): a vector of structural disturbances.

It is assumed also that \( \mathbf{P} y_i u_i = \mathbf{P} x_i u_i = 0 \), and \( \mathbf{P} u_i u_j = 0 \) for \( i \neq j \). That is, disturbance terms are uncorrelated with exogenous and endogenous variables and among themselves. \( \mathbf{P} \) stands for the population
correlation coefficient. Ordinary Least-Square procedures are used to provide the estimates of the model. Figure 3 represents a recursive model in observable variables.

A nonrecursive model in observable variables permits reciprocal causal relationships between the dependent variables. Econometricians have chiefly been interested in problems of identification, estimation and inference in nonrecursive models. Bielby and Hauser (1977) note that Equation 3.1 is a valid representation of this type of structural model, but they add some further qualifications. Coefficient matrix $B$ is not constrained to be "lower-triangular." Since simultaneous causation is assumed, some of the upper triangular elements might not be zero. In addition, the structural disturbance terms, $u_i$, may be correlated ($P_{u_i u_j} \neq 0$). Figure 4 shows a two-equation nonrecursive model in observable variables.

The final type of structural models dealt with by Bielby and Hauser (1977) are models with unobservable variables. This last type of model is the major focus of the present study. A more elaborate discussion of the features of this model will be postponed to the presentation of linear structural relationships by the method of maximum likelihood (LISREL) as discussed by Joreskog and Sorbom (1978). However, this discussion of linear structural models closes with a useful distinction made by Bielby and Hauser (1977, pp. 141-142) regarding aspects of unobserved or latent variables. First, they point out that concrete variables such as age may be subject to measurement error due to such sources as incorrect memory, response biases or inaccurate coding and
Figure 3. A recursive model in observable variables

Figure 4. A nonrecursive model in observable variables
record keeping; second, they note that accurately measured variables are taken to reflect variation in the underlying unmeasured construct that is inherently unobservable. This may be the case with domain sampling, where observable variables such as modernity attitudes are viewed as various aspects of the underlying theoretical construct. Bielby and Hauser (1977, pp. 143-144) note that both these aspects of measurement error may occur in the same structural model. However, since it seems difficult at the present to distinguish between these two measurement errors statistically, they are thus treated in the same way.

Finally, it is noted that structural equation models reflect the notion of system. Regression analysis and system analysis are parallel under the restriction that predictor variables and disturbances are uncorrelated. Otherwise, regression coefficients do not correspond to system parameters (Heise, 1975, pp. 151-152).

Specific studies employing structural equation models with unobserved variables and covering specific substantive areas of sociological interest are mainly a development of the last few years. The remainder of this section will review briefly most of these more recently published studies. In this way, it is hoped that a sense of the major advanced statistical techniques employed and the kind of substantive sociological problems dealt with can be imparted. Furthermore, it is expected that the importance of more powerful statistical tools considering measurement and specification errors in structural equation models will become more evident. Finally, a short review of these studies is deemed necessary, since they have aided the author in acquiring a better
grasp of the conceptual and methodological problems involved in their more sophisticated application.

Among the first, Warren, White and Fuller (1974) have discussed an error-in-variables analysis of the managerial role performance which is also employed in the present study. The authors examine a linear regression model with measurement errors in the independent variables and present Fuller's errors-in-variables procedure that provides estimators of the structural parameters and their variances. Estimates of the variance of measurement error in the independent variables was obtained through the use of multiple indicators. The authors discuss the basic assumptions of Fuller's errors-in-variables procedure and perform tests analogous to those associated with ordinary regression analysis.

Otto and Featherman (1975), with the use of a structural equation model, present estimates of the social structural and personality antecedents of two forms of early career alienation, self-estrangement and powerlessness. The conceptual model specifies background socio-economic variables (educational level, occupational prestige and income) and mental ability as exogenous variables. The sample consisted of panel data from a group of 17-year old men studied with a fifteen year interval between initial and follow-up waves. Analysis was done using multiple regression based on correlations corrected for unreliability. In establishing the interrelations, the authors estimated an over-identified factor analytic model using Joreskog's (1969) confirmatory factor analysis procedures (LISREL program). The major findings indi-
cated that the two forms of alienation are affected by different patterns of structural and personality antecedents originating at various stages in the first half of the life cycle.

In a later study, Inverarity (1976), using historical data, applied Joreskog's (1970, 1973) technique for the analysis of covariance structures (ACOVs computer program) to a Multiple Indicators-Multiple Causes (MIMIC) model of lynchings which occurred in Louisiana in the late nineteenth century. The major model tested by Inverarity consisted of three indicators and three causes of the unobserved variable mechanical solidarity. The exogenous variables (causes) were Percent Black, Urbanization and Religious Homogeneity. The measurement model linked the three indicators, Percent Democratic Vote in the 1892 Presidential Election, Percent Democratic Vote in the 1896 Gubernatorial Election, and Lynchings in 1889-1896 to Mechanical Solidarity. In a second structural equation model, Inverarity represents repressive justice as an indicator of mechanical solidarity. Considering the results reported by the author, it seems that some support probably exists for his model. Bohrnstedt's (1977, p. 656) comments on Inverarity's study show that the model should be rejected, while Bagozzi (1977, pp. 355-358) points out further methodological and conceptual problems in Inverarity's (1976) analysis.

In the area of attitude-behavior relationships, Alwin (1976) developed a structural equation model. He conceptualized attitude scales as congeneric measurements. Further conceptualizations of the measurement of verbal attitudes include the use of a single measure and the use
of parallel measures. The model represents a re-parameterization of an earlier one (Alwin, 1973), in which the Tittle-Hill data on political participation were analyzed. The author notes that by using any of the three above strategies, efficient estimates of the parameters of the model may be obtained with using the computer program LISREL (Joreskog and van Thillo, 1973). He presents the results of estimating the attitude behavior model by using only a congeneric formulation of verbal attitudes due to the less restrictive measurement assumptions involved. Moreover, due to the relaxed assumptions, certain differences hidden by the assumptions of the original formulation arise. The analysis reveals some specification errors in the form of the model estimated in 1973 and suggests some possible errors in the specification of the equations relating attitude constructs across time. Furthermore, the results of the study support the point of view that measurement error in verbal attitudes and true attitude change are important sources of bias which should be taken into account in attitude-behavior studies.

By using structural equation models, Bielby et al. (1977) assessed biases due to measurement errors of the intergenerational transmission of socio-economic status by estimating unobserved variable models. Their data were obtained from the remeasurement program of the 1973 Occupational Changes in a Generation II survey which allowed the estimation and testing of less restrictive models of response error and the assessment of the effects of plausible error structures on parameters of the achievement process. Responses were obtained from mailed questionnaires and subsequent telephone or personal follow-ups for more than 27,000
members of the experienced civilian labor force. A random subsample of about 1,000 respondents (600 nonblacks and 400 blacks) was selected for inclusion in the remeasurement program. The general computer programs prepared by Joreskog and his associates for the analysis of covariance structures (ACOVS) and for the analysis of linear structural equation systems with the method of maximum likelihood (LISREL I) were used for estimating model parameters and testing the models. Using the considerable evidence gathered, the authors concluded that reports of social background and achievement variables by nonblack males are wholly subject to random errors, while reports by black males appear subject to significant nonrandom error. When measurement errors are not considered for nonblacks, occupational returns to schooling are underestimated by about 15%; the effects of certain background variables (father's occupational status, parental income) are underestimated by as much as 22%; and variation in socio-economic achievements not attributable to education or social origins is underestimated by as much as 27%. They further note that biases appear to be substantially greater for blacks. The main conclusion drawn from this study is that neglecting measurement error exaggerates racial differences in returns to schooling and occupational inequality not attributable to social origins.

Singleton and Starner (1977) examined the extent to which subjective class identification is a unidimensional construct. To assess problems of validity and reliability, multiple indicators of subjective class were analyzed within the framework of a path analytic model with unobservable variables. The sample consisted of 800 adults from the city of Gary,
Indiana. It was obtained by using a modified probability sample with clusters and quotas. Blacks and whites were analyzed separately to control for the possible effects of race. Measures of objective class and political alienation were included in the construction of an overidentified model, and Joreskog's procedure for the analysis of covariance structures (ACOVS program) was used to examine the fit of the model to the data. A major finding of the study was that a model assuming unidimensionality among a set of indicators of subjective social class provides a better fit to the data than do plausible models assuming more than one dimension. The findings also generally hold for both subsamples of blacks and whites. The authors also demonstrated advantages of the multiple indicators approach by comparing regressions of the standard, single item measure and a composite measure of subjective class on education, occupational status, and income. Using an explicitly causal framework, Wheaton (1978) examined the whole issue of social causation versus social selection in psychological disorder. The study was undertaken in 1966 in a rural area of Illinois (Hennepin area) which was designated as the experimental area. This area was compared to a similar but nondeveloping rural area (Watseka area) in another part of the state, treated as the control area. Follow-ups of the original sample in each area were conducted in 1967 and 1971. The final sample size was 736 for the experimental area and 295 for the control area. Lagged effects of socio-economic status and psychological disorder on each other were employed. The panel model allowed for the specification of a causal system among a set of unobserved variables and multiple
indicators of these whenever it was possible. The model also provided a measurement specification relating the measured variables to the unmeasured variables. Joreskog's confirmatory factor analytic approach (LISREL) was used for the specification and estimation issues. Two models were developed, based on the geographical location of samples for testing the cause or consequence issue. Differences in results across samples suggest that some modification of the social causation position may be necessary.

In their study, Kohn and Schooler (1978) employed longitudinal data to make a more definitive assessment of a reciprocal relationship between the substantive complexity of men's work and their intellectual flexibility. They conducted a 10-year follow-up survey of a representative portion of the original sample which consisted of 3101 men who were representative of all men employed in civilian occupations in the United States. The authors developed "measurement models" for both concepts, "substantive complexity" and "intellectual flexibility," using maximum likelihood confirmatory factor analysis (Joreskog and van Thillo, 1972) to separate measurement error from real change. These models show that over a 10-year time span, the "stability" of both variables shorn of measurement error is high, especially that of intellectual flexibility. Utilizing the data provided by the measurement models, they did a causal analysis of the reciprocal effects of substantive complexity and intellectual flexibility. The reciprocal effect of intellectual flexibility on substantive complexity was pronounced, although it had a lagged effect. The methodological approach followed by the authors in analyzing
the data represents real improvement over the relatively simpler technique of "two-stage Least-Squares" employed by the authors in the past in analyzing cross-sectional data for estimating reciprocal causal models. The authors emphasize the point that definitive assessment of causality cannot be made based only on cross-sectional data. Only longitudinal research designs measuring real change in real people can be definitive.

Armer and Isaac (1978) estimate a full structural equation model of eight individual behaviors thought to contribute to societal modernization by incorporating measurement error of psychological modernity and allowing the disturbances in the equations to be correlated. They analyzed data collected from a stratified quota sample of 210 Costa Rican adult males. Their analysis followed three procedures. First, they employed Ordinary Least-Squares regression equations of the behavior as a function of psychological modernity and background variables such as age, rural-urban residence, income, education and occupation. Second, in addition to analyzing specific behaviors, the general magnitude of the modernity effect and background variables effects on modern behavior were estimated by forming indexes of background and behavioral indicators. Ordinary Least-Squares procedures were again followed. Third, a modified structural model which incorporated the fallible measurement of psychological modernity alone was estimated, and the eight behavioral equations were treated as an entire system. Parameters of the model were estimated with a full-information maximum likelihood program (LISREL III) developed by Joreskog. The program allowed for measurement error of
psychological modernity and residual terms in the equation to be correlated. The results indicate that psychological modernity has, in most cases, a negligible effect on behavior when measurement is assumed to be perfect. There are nonnegligible effects in the direction predicted for three of the eight behaviors when the measurement error in psychological modernity is taken into consideration.

Finally, in a series of papers dealing with macrosociology and the application of structural equation methods to the study of change at the international level, Yilmaz (1979) used a confirmatory factor-analytic model to estimate the effects of powerful mobilizing states on economic development. He employed a panel design with a sample of poor and developed countries. Joreskog's technique for the analysis of covariance structure (ACOVs) was used, which provides statistically efficient Least-Squares and maximum likelihood estimates of unknown parameters and a goodness of-fit test statistic. A number of indicators of political mobilization were used, such as power concentration, the number of political parties, internal security forces and control of the state over education. The results were consistent throughout the analysis. First, powerful centralized mobilizing states accelerate economic development only in relatively poor countries. Second, the effect is not felt after a time lag of about ten years. Finally, from a methodological point of view, the panel design used was significantly improved when the assumption that disturbance terms of the model and independent variables are uncorrelated was relaxed.
Several conclusions can be drawn from this short review of literature. First, application of structural equation models may cover quite diverse areas of substantive sociological interest; second, it appears that considerations for measurement error in our models become increasingly necessary if more valid conclusions are desired; and third, both computerized methods suggested by Joreskog (ACOVSS, LISREL) enhance the analysis and testing of longitudinal research designs. Joreskog and Sorbom (1977) especially expose a large variety of longitudinal models with linear structural relationships that can be analyzed by the method of maximum likelihood (LISREL). This potential seems quite promising for stronger causal assertions and more definitive tests of theories.

Causal modeling and sociological measurement

The use of linear causal models as a device for bridging sociological theory and research based on classical statistical analysis is a development which was undertaken in the early sixties.

Blalock (1961) made the pioneer contribution in the development of causal modeling techniques, chiefly with his publication "Causal Inferences in Nonexperimental Research." A major contribution of path analytic techniques is, according to Land (1970, p. 507), the ability to calculate the degree that one variable affects others in a system of simultaneous equations. This is possible since path coefficients are "standardized structural coefficients." Duncan (1966, pp. 5-6) has illustrated that based on this property, a theorem can be derived which makes possible the decomposition of the zero-order correlation coefficient for two variables into parameter estimates of the direct and
indirect effects of one variable on the other through the presumed causal structure (Land, 1969, p. 7). A second major advantage of path analysis is its ability to treat hypothetical constructs not measured directly in a postulated causal structure. Land (1970) delineates two cases in which unmeasured variables will be of interest to sociologists in a causal model. The first of these concerns the study and treatment of measurement error, and the second the use of unmeasured variables that intervene between measured variables in a causal model.

The present study is concerned chiefly with interaction between unmeasured variables and their observed counterparts. Some major developments that have occurred in this direction will be reviewed in brief.

First, Curtis and Jackson (1962, p. 195), contrary to the traditional use of combining indicators into composite indexes, suggest individual use of multiple indicators by observing the pattern of associations between each indicator of the independent variable(s) and each indicator of the dependent variable(s). They discuss further many of the advantages of this approach.

Duncan (1966) was the first among sociologists to introduce path analysis as a linear modeling device and an analytical tool, although it was developed years earlier by the geneticist Sewall Wright (1934). Duncan illustrates—based on the fact that path analysis deals with standardized structural coefficients—the decomposition of zero order coefficients into parameter estimates of the direct and indirect effects of one variable on the other through the postulated causal structure.
Blalock (1968) suggests the introduction of causal assumptions in linking an unobserved variable with its indicators. Blalock views these specific assumptions (some of which may be inherently untestable or simplifying) as potentially forming what he calls "an auxiliary theory." His discussion focuses on the specification of "epistemic correlations" and further emphasizes the importance of theoretical considerations before resolving analytical and measurement problems. Further, Siegel and Hodge (1968) employ path analytic techniques to study discrepancies between census and sample survey measures of the same variables. They note the distorting effects of measurement errors on parameter estimation and further delineate various sources of errors in surveys.

In 1969, a series of papers with focus on measurement considerations appeared using path analytic approaches. Heise (1969a) attempts to estimate the true reliability and stability of a measure from data collected at three or more points in time using path analytic techniques. He deals with single indicators and panel data and considers distortions producing nonrandom measurement error. In addition, Costner (1969), following the lead of Blalock (1968) and Siegel and Hodge (1968), attempts to use auxiliary theories gradually from simplified to more complex ones in bridging the gap between theoretical and empirical language. Costner illustrates with multiple indicators for each variable—incorporated as an extension of a causal model how estimates of the parameters of a path model can be obtained. He further introduces the idea of "consistency criterion," which refers to patterns of intercorrelations among indicators of two different but related constructs.
These patterns require that certain products of correlations shall be identical or that several estimates of a single abstract coefficient shall be consistent. Costner's approach has met various criticisms, but yet provides stimulation for further research.

Mayer and Younker (1974, pp. 192-194) summarize some of the major limitations of Costner's approach and suggest ways of removing some of these. McPherson et al. (1977, pp. 511-513) also point out some of the drawbacks of Costner's solution and contrast it with Joreskog's (1970, 1973) solution. Further, Blalock (1969, p. 264) illustrates that the utility of the multiple indicators approach discussed in Costner's paper holds generally for any recursive system (linear and additive) assuming random measurement error. He further contends that under special circumstances, Costner's approach can be used with a single estimator if one is willing to make strong *a priori* assumptions about the model. Later, Blalock (1970) combined the multiple indicator approach proposed by Costner (1969) with Heise's (1969a) longitudinal design to indirectly test the assumptions involved. Blalock reaches the important conclusion that careful planning of studies with measurement error considerations is necessary in advancing analytical techniques.

A test of Heise's (1969a) assumptions was also undertaken by Wiley and Wiley (1970). The authors used estimation of random measurement errors by employing repeated measurements on the same population over time. The authors challenge as doubtful the assumption—necessary for the validity of Heise's empirical model—that the reliability of measured scores is stable over time. They contend that this is valid
only if the reliabilities are homogenous; however, this appears to be an implausible assumption. Concluding that Heise's measures of stability are contaminated by heterogeneity in the reliabilities, they suggest that it is more realistic to assume invariant components of error variance in the observed variables than to assume constant reliability, since reliability varies both with error variance and true variance.

Through the above exposition of the causal approach to sociological measurement, it is hoped that the gradual evolution from simpler and more restrictive models to more complex and flexible ones is well-illustrated. It also serves to introduce in a more meaningful way the causal approach to measurement error and respective reliability estimates which will be discussed in the next section. The panel design and the single or multiple indicators used in these models for each unmeasured variable can be described and estimated efficiently under Joreskog's (1969) model of linear structural relations (LISREL).

Causal approach to measurement error and reliability estimates

In classical measurement theory, we distinguish between the observed variable $X_i$, and its true value, $x_i$. Conceptually, this model describes how measurement errors can influence observed scores. The model makes certain assumptions which, depending upon their reasonableness, may lead to more or less reasonable conclusions.

Allen and Yen (1979, p. 57) summarize the assumptions on which classical measurement theory rests as follows.
According to Assumption 1 (Equation 3.2) the observed score is the sum of two components: $x_1$, the true score, and $e_1$, the error of measurement. Customarily, in measurement theory it is assumed that the above two quantities are related linearly and not multiplicatively. Similar assumptions underlie analysis of variance and factor analysis. Wiley and Wiley (1970, p. 112) point out that error is a property of the measuring instrument and not of the population to which it is administered. True score variance is better conceived as a property of the population. Specifying stable reliability implies assumptions about population as well as assumptions concerning the measuring instrument.

Assumption 2 (Equation 3.3), $E(X_1) = x_1$ states that the expected value (population mean) of $X_1$ is $x_1$. 

\[ X_1 = x_1 + e_1 \]  

where $X_1$: observed $i$-th value of variable $X$  

$x_1$: true $i$-th value of variable $X$  

e_1$: error of measurement of the $i$-th case of variable $X$  

\[ E(X_1) = x_1 \]  

\[ E(e_1) = 0 \]  

\[ P_{x_1}e_1 = 0 \]  

\[ P_{e_1}e_j = 0 \]  

\[ P_{x_1}e_j = 0 \]
Assumption 3 (Equation 3.4), \( E(e_i) = 0 \) means that the error term is random; that is, there will be positive and negative errors in measurement and in the long run, they will cancel each other out. This implies that errors have a zero mean. Systematic errors are not called errors of measurement in classical measurement theory.

Assumption 4 (Equation 3.5), \( P_{x_i e_i} = 0 \), states that the residual terms, \( e_i \), are uncorrelated with the true value (unobserved construct), \( x_i \). \( P \) is the correlation coefficient between two variables in the population. This assumption is quite important for further derivations.

Assumption 5 (Equation 3.6), \( P_{e_i e_j} = 0 \), suggests that errors in variables are uncorrelated with each other.

Assumption 6 (Equation 3.7), \( P_{x_i e_j} = 0 \) states that the measurement error of one variable and the true score of another variable are uncorrelated.

Assumption 1 can be written in a more complete form as follows (see Werts et al., 1974):

\[
X_i = a + (P_{xx})x_i + e_i
\]  

(3.8)

From Equation 3.8 the relationship between \( X_i \) and \( x_i \) can be illustrated in a path diagram as in Figure 5 (Heise, 1969a). In Equation 3.8 \( P_{xx} \) is the slope of the regression of the observed variable \( X_i \) on the true value, \( x_i \), and indicates the amount of relationship between \( X_i \) and \( x_i \). The intercept of this regression line is indicated by \( a \).

Finally, \( e_i \), is a residual term designated by econometricians as "disturbance terms" or by psychometricians as "errors of measurement." \( P_{xx} \) in Equation 3.8 indicates the relationship between the unit of
Figure 5. Path analytic approach to measurement error (one indicator per unobserved variable)
measurement of the observed variable, $X_1$, and that of its true value, $x_1$. A weight equal to unity corresponds to the assumption that the observed variable and the construct have the same unit of measurement.

Path analytic techniques can be applied to define reliability. These reliability estimates are based on further assumptions made by classic measurement theory (Allen and Yen, 1979). We are going to proceed from more restrictive to less restrictive assumptions. Less restrictive assumptions can be used to an advantage in estimating the reliability of measures without imposing conditions which may be unrealistic.

First, the more traditional view of reliability as equivalent, parallel forms is considered. Besides the formerly mentioned assumptions of classical measurement theory, an additional assumption made here is that both forms (measured) have the same true value and error variance (Allen and Yen, 1979, p. 57). The measurement model in this case is:

$$X_1 = (P_{x_1}x_1)x + e_1 \quad (3.9)$$
$$X_2 = (P_{x_2}x_2)x + e_2 \quad (3.10)$$

Note that Figure 6 represents the path diagram for the measurement model in Equations 3.9 and 3.10. From Figure 6 and the rules of path analysis it is evident that:

\[ \text{That feature of path analysis is employed so that one may write a total correlation between any two variables as a simple function of the path coefficients that connect those variables.} \]
Figure 6. Path analytic approach to measurement error (two indicators per unmeasured variable)
\[ \rho_{X_1X_2} = (\rho_{XX})(\rho_{XX}) = (\rho_{XX})^2 = \text{reliability coefficient}. \]

That is, following the path analytic approach to measurement error, the reliability coefficient is the square of the traditional validity coefficient under the parallel or equivalent assumption of estimating reliability.

Another widely held assumption, less restrictive than the equivalence assumption, is the "essentially tau equivalence" assumption for multiple measures of an underlying construct (Werts et al., 1974, p. 273; Allen and Yen, 1979, p. 57). Given two measures \( X_1 \) and \( X_2 \), the model this time is

\[ X_1 = \rho_{X_1X_1} x + e_1 \tag{3.11} \]
\[ X_2 = \rho_{X_2X_2} x + e_2 \tag{3.12} \]

In this case, it is assumed that the true scores are identical. However, error variances are not assumed equal. Hence, we have different reliabilities. The latter assumption is less restrictive than the equality of error variances assumption in the parallel forms. If two measures of an underlying construct are parallel, they more than satisfy the definition of essentially tau equivalent tests. However, two tests that are essentially tau equivalent are not necessarily parallel (Allen and Yen, 1979). Based on the assumptions of classical measurement theory and also on the tau equivalence assumption, it can be proven that the reliability of the observed variable is defined as the ratio of the true score variance to the observed variance.
The essentially tau equivalence assumption further implies that the indicators of the construct are assumed to have the same unit of measurement. In case the observed measures have different units, the unit of the construct is arbitrary and is usually fixed by the assignment of a variance of unity. An alternative way is to identify the unit of one of the measures with that of the unmeasured construct by specifying the corresponding regression weight to be unity. Joreskog (1971) calls the various indicators of the underlying variable congeneric measures \((P_{x_1x_1} \neq P_{x_2x_2} \neq P_{x_1x_1})\) assuming, of course, that the errors are independent of each other and of the construct.

In the case of congeneric scores, Alwin (1976, pp. 377-378) notes that true scores are linearly related. Congeneric scores do not make any assumption about equality of true scores; nor is anything assumed about the equality of their variances except the usual assumptions of classic measurement theory. Hence, reliability estimates of scores are not based on assumptions that may be unrealistic. Alwin (1976, p. 378) defines reliability under the congeneric assumption and suggests a way to maximize reliability estimates for multiple item measures.

**Least squares regression**

Multiple regression is appropriate when the focus is on analyzing observed scores on one dependent variable based on the predictive power of several observed independent variables (Kerlinger and Pedhazur, 1973). Multiple linear regression is used generally in this research along with single regression. In the latter case the focus is on the contribution
of one variable to the explanation of a dependent variable.

The classic linear regression model with \( K \) independent variables, \( X \) and a dependent variable \( Y \), plus the error \( e \), is defined as

\[
y_i = f_0 + \sum_{i=1}^{K} X_i + e 
\]

(3.13)

where \( f_0 \) = intercept constant.

Among the basic assumptions of multiple regression are the linearity and additivity assumptions for the independent variables. Another is that multi-collinearity is not present and also that an interval level of measurement is used both for the dependent and independent variables. Additional assumptions for hypothesis testing purposes include the normality assumption for the conditional distribution of the dependent variable within categories of the independent variables and the homoscedasticity assumption for the variance of dependent variable across categories of the independent variables (Loether and 1974, pp. 308-309). Additional assumptions are required for testing causal models (Warren, Klonglan and Faisal, 1977, pp. 130-132). These assumptions concern the theoretical sequencing of independent variables, the specification problem, the fact that the measures of variables must be highly reliable and that error terms should be uncorrelated with each other or with the independent variables. Some further causal assumptions specify that the system of interest contain no reciprocal causation or concern the identification of model parameters.
The Least-Squares approach provides sample estimates of the population parameters $\beta$ as well as estimates of their variance (standard errors) so that $t$-tests of the statistical significance for each specific population parameter can be performed. In this way the contribution of each specific variable in the regression model controlling for the rest of the variables can be determined. One of the most valuable statistics of multiple regression is the coefficient of multiple correlation $R$. The multiple correlation coefficient indicates how well the regression equation is able to predict scores on the dependent variable. The square of this coefficient, $R^2$, is even more valuable. $R^2$ is called the coefficient of multiple determination and is the proportion of variation in the observed dependent variable explained by the observed independent variables. An $F$-test for the significance of the overall regression model is possible.

The interested reader can find a more detailed discussion of the assumptions and criteria for evaluating linear regression models in such sources as Draper and Smith (1966), Kerlinger and Pedhazur (1973), or Loether and McTavish (1974).

**Errors-in-variables**

Problems of errors-in-variables have confronted various disciplines in the social sciences in different degrees (Fox and Kaul, 1979, p. 79). Econometricians have focused mostly on the linear simultaneous equation systems in which they consider disturbances (residuals) in equations, but not measurement error in variables. Statistically-oriented sociologists
and psychometricians have concentrated on errors-in-variables models either in the form of factor analysis or test score theory (Bielby and Hauser, 1977).

The present study concentrates on the errors-in-variables technique as originally developed by Fuller (1971) and further elaborated by Fuller and Battese (1973) as well as by Warren, White and Fuller (1974). A computer program called SUPER CARP (Cluster Analysis and Regression Program) has also been developed and gradually improved by the Statistics Department at Iowa State University (Hidiroglou, Fuller and Hickman, 1979). This program efficiently handles all estimation procedures available in Fuller's errors-in-variables technique.

The errors-in-variables procedure is a regression approach that can handle both measurement error and specification error in assessing the relationship between a dependent variable and a number of independent variables (Faisal and Warren, 1978). Specification error generally refers to inappropriate specification of the real form of the relationships among the variables of the model, or failure to include the most appropriate variables in the model.

The general assumption of classic measurement theory, that the observed variable is both a linear function of the true score and an error term, is also basic for both the dependent and independent variables of a model where the error-in-variables technique is applied.

The basic equation of the errors-in-variables procedure in matrix notation is

\[ n = \xi \Gamma + \zeta \]  

(3.14)
where $n$ = a vector of the unobserved dependent variables; $\xi$ = a matrix of unobserved independent variables; $\Gamma$ is a coefficient matrix of the true dependent variable on the true independent variables and represents the unknown parameters we wish to estimate; $\zeta$ = a vector of specification errors.\(^1\)

The above equation, in combination with the general assumption of classical measurement theory, may be generalized in such a way so that the observed value of a dependent variable is indicated to be a function of the observed values of independent variables plus measurement error and specification error (Faisal and Warren, 1978).

The EIV procedure assumes large sample sizes, but not normally distributed dependent and independent variables. Measurement errors for both the dependent and independent variables are independently and identically distributed as a multivariate normal. Furthermore, measurement errors are uncorrelated with the true values of independent variables and specification errors.

Finally, specification errors are independent of each other and of the true values of independent variables.

The SUPER CARP program separately analyzes each endogenous variable of a given model. Calculation of the variance of the measurement error in the independent variables or information on reliability is necessary for the SUPER CARP program to work. Weights and measurement error for

\(^1\)The present short discussion on the EIV procedure follows symbolic notation comparable to that of the LISREL model to ensure comparability and a better understanding. In this respect, the usual notational symbols appearing in the course of development and exposition of this technique have not been followed.
each indicator of the unobserved (true) variables is determined prior to the analysis. The program allows for a test of singularity of the regression model. That is the extent to which two or more variables of the regression model are linearly nonindependent (multi-collinearity). In such a case the program stops, and action must be taken to drop relevant variables or combine them into composites.

The errors-in-variables procedure in combination with the SUPER CARP program provides a test of significance using the F-statistic for the corrected partial regression coefficients and also prints out respective standard errors. This allows for the assessment of the true contribution of each variable in the model while the effects of the other independent variables are held constant. The program further allows for various F-tests of combinations of corrected partial regression coefficients.

Specification error is calculated separately for each equation as a function of the mean square residual provided by the SUPER CARP program measurement error variance of both the dependent and independent variables and the corrected partial regression coefficients.

The errors-in-variables procedure further provides the grounds for decomposing the observed variance of the dependent variable into measurement error variance, explained variance by the model and unexplained or specification error variance. The last two variance components combined represent the estimated true variance of the dependent variable. Based on the above decomposition, after appropriate calculations are made, the corrected squared multiple correlation coefficient ($R^2$) can be obtained.
This is interpreted as the estimated proportion of variation in the true dependent variable explained by the true values of the independent variables.

Finally, the errors-in-variables procedure provides an F-ratio for testing the significance of the overall regression model. Through a separate analysis the significance of the specification error of the last dependent (endogenous) variable in the model can be tested. A non-significant specification error implies a good model. The interested reader may find a more elaborate discussion of the EIV procedure in Faisal and Warren's (1978) expository paper. Aziz (1978) and Warren et al. (1974) also discuss and apply this technique with sophistication.

**LISREL**

Joreskog's general model for linear structural equation systems (LISREL) subsumes a variety of recursive and nonrecursive models with two forms of variables: first, the variables may be directly observed variables (measures, indicators); second, the variables may be latent variables (true values, unobserved variables). Single or multiple indicators may correspond to each unobserved variable. The model generally assumes large random samples and normal distribution of the observed variables for efficient estimation of model parameters.

Joreskog's LISREL model attempts to synthesize many structural modeling approaches in econometrics, psychometrics and sociometrics. The notions of "unobserved variables" and "factor analytic" approaches which are discussed in psychometrics are evident in the model as well as
the econometric notions of "simultaneity" and "disturbance terms." The LISREL model uses a confirmatory factor analytic approach. Long (1976) has indicated in his expository paper the common assumptions in both. From a sociological point of view, models in the path analytic literature on unmeasured variables with one or more indicators per measured variable and with two or more observations through time (panel designs—Blalock, 1969; Costner, 1969; Wiley and Wiley, 1970) fit well in Joreskog's LISREL model. Joreskog and Sorbom (1977) exposited and further efficiently estimates a large class of such models.

The LISREL procedure uses a gradually updated computer program referred to in the rest of this study as LISREL IV (Joreskog and Sorbom, 1979). This is a general computer program for estimating the unknown parameters in a system of linear structural equations by the method of maximum likelihood. It is the most recent version among a family of similar programs developed in the last ten years by Joreskog and his associates.

The LISREL IV model is composed of two parts: the measurement model and the structural equation model. The measurement model specifies how the latent variables are measured in terms of the observed variables and is used to describe the real causal structure and the amount of unexplained variance (specification error). Equation 3.15 below describes the structural equation model

\[ B\eta = \Gamma \xi + \zeta \]  

(3.15)
where B is coefficient matrix between the endogenous variables of the model and $\Gamma$ is a coefficient matrix between exogenous and endogenous variables. Both matrices represent parameters of the model and describe the real causal structure in the sense that by properly manipulating the elements in matrices B and $\Gamma$, we can respectively depict a certain causal structure (recursive or nonrecursive) among the concepts of our theory. Latent dependent and independent variables are designated accordingly by the random vectors $\eta$ and $\xi$. Finally, $\zeta$ is the random vector of residuals and corresponds to the specification error.

Above, as well as in all LISREL equations, linear relationships are assumed. Some further major assumptions are that the unobserved independent variables are uncorrelated with the residuals. Finally, the matrix of unobserved dependent variables B is assumed to be nonsingular, so its inverse matrix exists.

The measurement model consists of Equations 3.16 and 3.17. It relates latent variables to their observable counterpart.

\[
y = \Lambda_y \eta + \varepsilon \quad (3.16)
\]
\[
x = \Lambda_x \xi + \delta \quad (3.17)
\]

The assumption in the measurement model is that variables $\eta$ and $\xi$ are unobserved. Instead, the observed variables for the model are designated by vectors y and x respectively for the dependent and independent variables. In Equations 3.16 and 3.17 linear relationships are again assumed. It is also assumed that the sets of the observed
dependent and independent variables satisfy factor analysis models with two types of factors: common factors, \( n \) and \( \xi \), each of which may influence any of the observed variables, and residual or unique factors \( \varepsilon \) and \( \delta \), which may influence one only observed variable (Long, 1976, p. 160). In this sense, \( \Lambda_y \) and \( \Lambda_x \) are factor-loading matrices and represent the weights assigned to the indicators. Weights and measurement error for each specific indicator may be internally estimated by the program.

In short, the usual assumptions of factor analysis made in LISREL are: first, that errors of measurement are uncorrelated with the unobserved dependent and independent variables; second, that the measurement errors in the measurement model are uncorrelated with the disturbances in the structural model; and third, that the observed dependent and independent variables have a multivariate normal distribution. In essence, the approach selects estimates for each path, which accurately reproduces the correlations among the observed variables. The program prints out the residuals between the observed and predicted covariance matrices. This information can be used in respecifying the model.

Joreskog's procedure gives unique efficient estimates of the structural parameters \( B \) and \( \Gamma \) as well as estimates of their standard error and respective t-values for tests of statistical significance of each single parameter. Since the estimated parameters correspond to the structure of relationships among unobserved variables, they represent true values, free of measurement error. Note that the system of structural equations in the LISREL model is examined as a whole, along with
the equations of the measurement model yielding estimates of structural parameters for each endogenous variable in only one analysis.

The LISREL model in combination with the computerized program LISREL IV provides a likelihood chi-square goodness-of-fit test which allows hypothesis tests to be made for the whole model. It also provides information useful in respecifying the initial model by freeing up restricted parameters. Thus, by fixing or constraining certain parameters to be equal, the consequences of goodness of fit can be monitored. The fit may be examined and assessed by an inspection of the covariance residuals. Values of $x^2$ that are larger in comparison to the number of degrees of freedom indicate that the model does not fit the data well (Joreskog, 1969, p. 201). By relaxing the model, if we obtain values of $x^2$ close to the number of degrees of freedom, this is an indication that the model "fits too well." In addition, Joreskog and Sorbom (1979, p. 15) allow that a large drop in $x^2$, compared to the difference in degrees of freedom, suggests that the changes made in the model represent a real improvement. On the other hand, a drop in $x^2$ parallel to that in number of degrees of freedom indicates that the improvement in fit is obtained by "capitalizing on chance" and that the fitted parameters may not have "real significance and meaning." According to Joreskog (1969, p. 201), when to stop relaxing the model is not based "on a purely statistical basis." This is based mainly on substantive and theoretical considerations and the way the researcher interprets his data. A final point to be made is that the likelihood ratio technique provides valid results regarding the fit of the model if the assumptions
of multinormality and large samples are met.

The program also provides estimates of specification error for each endogenous variable in the model. Corresponding standard errors and tests of statistical significance for all model parameters, along with the standardized values of structural coefficients are provided as well. The program further handles problems of measurement errors and reciprocal causation. In addition, the general LISREL model subsumes many models as special cases. Finally, unobserved variables can also be treated as caused by observed variables. For more information on these options and procedural techniques, the LISREL manual (Joreskog and Sorbom, 1979) is a very good source.

Estimation of measurement errors and quality of indicators

In this section, an attempt will be made to estimate the measurement error of the composite indicators and to further assess the quality of the composite measures, outlining a procedure that is based on the measurement error of each indicator and the use of descriptive statistics.

Estimation of measurement error is based on the following equation.

\[ \sigma_e^2 = \sigma_x^2 - [p(\sigma_x^2)] \]  \hspace{1cm} (3.18)

where \( \sigma_e^2 \): variance of measurement error of variable \( X \)

\( \sigma_x^2 \): observed score variance of \( X \)

\( p \): reliability of composite measure

\( p\sigma_x^2 \): true score variance of \( X \).
The derivation of this equation is discussed in Faisal and Warren (1978). For instance, in the case of size based on available information on Table 1, the estimation of measurement error is as follows:

\[
\sigma_{size}^2 = \sigma_{size}^2 - [P_{size}(\sigma_{size}^2)]
\]

\[
= .8875 - [( .8732)(.8875)]
\]

\[
= .1125
\]

The variances of errors of measurement for all variables analyzed in this study are presented in Table 1 along with sample variance, true variance, reliability mean values, standard deviation and number of items.

By examining the variance of measurement error in an indicator, it is possible to calculate an F-test for the presence of true variance (Warren, Klonglan and Faisal, 1977, pp. 60-61).

The null hypothesis \((H_0)\) states that the variance of the true score, \(S_{x_1}^2\), be equal to zero. In other words:

\[
H_0 : S_{x_1}^2 \text{ (sample variance of variable } X_1 \text{)} = 0
\]

\[
H_a : S_{x_1}^2 \text{ (sample variance of variable } X_1 \text{)} \neq 0
\]

The test statistic is calculated as follows.

\[
F = \frac{S_{x_1}^2}{S_{e_1}^2}
\]

(3.19)

where \(S_{x_1}^2\) : observed variance of variable \(X_1\)

\(S_{e_1}^2\) : estimated error variance of variable \(X_1\).
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<th>True variance</th>
<th>Measurement error variance</th>
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<tr>
<td>Net savings(^a)</td>
<td>.851</td>
<td>.895</td>
<td>.702</td>
<td>.149</td>
<td>.000</td>
</tr>
</tbody>
</table>

\(^a\)The original number of dollars of net operating revenue and net savings is divided by 10,000.
Table 1 (Continued)

<table>
<thead>
<tr>
<th>Measures</th>
<th>Standard deviation</th>
<th>Number of items</th>
<th>Sample variance of split A</th>
<th>Sample variance of split B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selectivity</td>
<td>.472</td>
<td>13</td>
<td>.282</td>
<td>.263</td>
</tr>
<tr>
<td>Elite consensus</td>
<td>2.104</td>
<td>7</td>
<td>6.087</td>
<td>5.042</td>
</tr>
<tr>
<td>Market potential</td>
<td>.958</td>
<td>3</td>
<td>.872</td>
<td>1.000</td>
</tr>
<tr>
<td>Competition</td>
<td>3.950</td>
<td>2</td>
<td>26.298</td>
<td>11.783</td>
</tr>
<tr>
<td>Size</td>
<td>.942</td>
<td>2</td>
<td>1.000</td>
<td>1.000</td>
</tr>
<tr>
<td>Structural differentiation</td>
<td>1.489</td>
<td>4</td>
<td>2.837</td>
<td>2.743</td>
</tr>
<tr>
<td>Scope</td>
<td>.439</td>
<td>11</td>
<td>.289</td>
<td>.221</td>
</tr>
<tr>
<td>Pervasiveness</td>
<td>.549</td>
<td>7</td>
<td>.463</td>
<td>.368</td>
</tr>
<tr>
<td>Socialization</td>
<td>.634</td>
<td>6</td>
<td>.453</td>
<td>.550</td>
</tr>
<tr>
<td>Communication</td>
<td>.423</td>
<td>14</td>
<td>.258</td>
<td>.223</td>
</tr>
<tr>
<td>Salience</td>
<td>1.758</td>
<td>13</td>
<td>3.744</td>
<td>3.756</td>
</tr>
<tr>
<td>Tension</td>
<td>1.347</td>
<td>6</td>
<td>2.838</td>
<td>2.240</td>
</tr>
<tr>
<td>Role performance</td>
<td>.531</td>
<td>9</td>
<td>.420</td>
<td>.334</td>
</tr>
<tr>
<td>Net operating revenue^a</td>
<td>.989</td>
<td>2</td>
<td>1.000</td>
<td>1.000</td>
</tr>
<tr>
<td>Net savings^a</td>
<td>.923</td>
<td>2</td>
<td>1.000</td>
<td>1.000</td>
</tr>
</tbody>
</table>
The calculated $F$ value in Equation 3.19 above is compared with the $F$-tabular value for $(n-1)$ and $(n-1)$ degrees of freedom accordingly for the numerator and the denominator. Interpretation of the test results is based on the following reasoning.

If the $F$-value is found to be significant, the null hypothesis can be rejected. This leads to the conclusion that based on the available statistical evidence, part of the variation in the indicator is due to true variation. Nonsignificant values imply that most of the variation in the variables of our interest was due to measurement error and the indicator would have to be discarded.

Testing for the variables the $F$'s are 50.44, 4.53, 4.54, 3.88, 7.88, 2.63, 3.07, 3.86, 4.02, 2.90, 4.70, 2.50, 2.99, 45.51 and 5.72 for market potential, competition, selectivity, consensus, size, pervasiveness, scope, structural differentiation, socialization, communication, salience, tension, role performance, net operating revenue and savings.

A comparison with the tabular value of $F(152,152; .05) = 1.27$ leads to the rejection of the null hypothesis for all the variables considered. This leads to the conclusion that at least some of the observed variation is true variation for each of the variables stated above and no observed variable is made up solely of measurement error.

**Empirical hypotheses**

In this section, the empirical hypotheses corresponding to the theoretical hypotheses that have been formulated in the previous chapter will be presented. This is another step that it seems appropriate to
take after discussing the measurement of theoretical concepts as an effort to bridge the theoretical with the empirical level of analysis.

The presentation of empirical hypotheses does not follow the order of theoretical hypotheses. Rather, the empirical hypotheses will be presented in the following sequence. First, empirical hypotheses pertaining to the exogenous variables of the cooperative effectiveness model will be presented. These variables refer to the sets of environmental and specific input variables as well as the variable of size. Second, empirical hypotheses pertaining to intraorganizational or throughput variables in a system’s framework will be presented. These variables refer to Etzioni’s compliance correlates and the variable of structural differentiation. Organizational effectiveness, taken as the output variable in this system’s framework will be accordingly included in empirical hypotheses with certain of the input and throughput variables of the theoretical model.

Empirical Hypotheses linking environmental variables, input variables and size to throughput variables

E.H.1 The higher the selectivity score of an organization, the higher its pervasiveness score
E.H.2 The higher the selectivity score of an organization, the higher its scope score
E.H.3 The higher the consensus score among organizational representatives, the higher the organizational pervasiveness score
E.H.4 The higher the competition’s score in the organization’s environment, the higher its scope score
E.H.5 The higher the competition's score in the organization's environment, the higher its pervasiveness score
E.H.6 The higher the market potential score of an organization, the higher its structural differentiation score.

E.H.7 The higher the size score of an organization, the higher its structural differentiation score.

E.H.8 The higher the size score of an organization, the higher its scope score.

E.H.9 The higher the size score of an organization, the higher its pervasiveness score.

E.H.10 The higher the competition's score in the organization's environment, the higher its structural differentiation score.

Empirical hypotheses linking environmental variables, input variables, and size to organizational effectiveness as an output variable.

E.H.11 The higher the selectivity score of an organization, the higher its effectiveness score.

E.H.12 The higher the consensus score among organizational representatives, the higher its effectiveness score.

E.H.13 The higher the market potential score of an organization, the higher its effectiveness score.

Empirical hypotheses linking throughput variables among themselves.

E.H.14 The higher the scope score of an organization, the higher its socialization score.

E.H.15 The higher the scope score of an organization, the higher its communication score.

E.H.16 The higher the scope score of an organization, the higher its pervasiveness score.

E.H.17 The higher the salience score for an organization, the higher its tension score.

E.H.18 The higher the pervasiveness score of an organization, the higher its socialization score.

E.H.19 The higher the structural differentiation score of an organization, the higher its communication score.
E.H.20 The higher the socialization score of an organization, the higher its communication score

E.H.21 The higher the structural differentiation score of an organization, the higher its socialization score

E.H.22 The higher the socialization score of an organization, the higher its salience score

E.H.23 The higher the communication score of an organization, the higher its salience score

Empirical hypotheses linking throughput variables to organizational effectiveness as an output variable.

E.H.24 The higher the scope score of an organization, the higher its organizational effectiveness score

E.H.25 The higher the pervasiveness score of an organization, the higher its organizational effectiveness score

E.H.26 The higher the socialization score of an organization, the higher its organizational effectiveness score

E.H.27 The higher the tension score of an organization, the lower its organizational effectiveness score

E.H.28 The higher the salience score of an organization, the higher its organizational effectiveness score

E.H.29 The higher the communication score of an organization, the higher its organizational effectiveness score

E.H.30 The higher the structural differentiation score of an organization, the higher its organizational effectiveness score.
CHAPTER 4.

FINDINGS

Introduction

The testing of the cooperative organizational effectiveness model with LISREL IV, SUPER CARP and the Ordinary Least-Squares approaches will be presented and discussed in this chapter. Based on theoretical orientations and examinations of present data, alternative models were considered. The testing of the initially developed theoretical model of cooperative organizational effectiveness was examined by all three analysis procedures when only role performance was used as a measure of organizational effectiveness. The findings of the analysis with the Ordinary Least-Squares (OLS), Errors-in-Variables (EIV) and LISREL procedures will be compared and discussed. Two alternative models were further suggested based on paths that proved to be nonsignificant and on the examination of residuals. These models will also be presented and discussed. The final model, Model III, is developed and tested by using only the LISREL procedure.

Model I

The theoretical framework of the cooperative effectiveness model was discussed in Chapter Two. In Chapter Three, the major models on which the EIV, LISREL and OLS procedures are based were presented.

Figure 7 presents a diagram of the structural and measurement portions of the initial model of cooperative organizational effectiveness, according to the LISREL specification. Table 2 summarizes the
Figure 7. Model I of cooperative organization.
I>
I

fENESS
^SOCIALIZATION

SALIENCE
SCOPE
COMMUNICATION

STRUCTURAL
\
DIFFERENTIATION

c,operative organizational effectiveness (LISREL specification).

TENSION


SPECIFICATION ERROR

COMMUNICATION

SALIENCE

TENSION

ROLF

PERFORMANCE

MEASUREMENT ERROR

\textit{L}iveness (LISREL specification).
Table 2. Summary of the structural and measurement aspects of the cooperative organizational effectiveness model (Model I)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Structural component abbreviations</th>
<th>Measurement component(^a)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>OV</td>
</tr>
<tr>
<td>A. Independent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Elite Consensus</td>
<td>CONS ([\xi_1])</td>
<td></td>
</tr>
<tr>
<td>2. Selectivity</td>
<td>SELT ([\xi_2])</td>
<td></td>
</tr>
<tr>
<td>3. Competition</td>
<td>COMP ([\xi_3])</td>
<td></td>
</tr>
<tr>
<td>4. Market Potential</td>
<td>MKPT ([\xi_4])</td>
<td></td>
</tr>
<tr>
<td>5. Size</td>
<td>SIZE ([\xi_5])</td>
<td></td>
</tr>
<tr>
<td>B. Dependent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Structural Differentiation</td>
<td>STRD ([\eta_1])</td>
<td></td>
</tr>
<tr>
<td>2. Scope</td>
<td>SCOP ([\eta_2])</td>
<td></td>
</tr>
<tr>
<td>3. Pervasiveness</td>
<td>PERV ([\eta_3])</td>
<td></td>
</tr>
<tr>
<td>4. Socialization</td>
<td>SOCL ([\eta_4])</td>
<td></td>
</tr>
<tr>
<td>5. Communication</td>
<td>COMM ([\eta_5])</td>
<td></td>
</tr>
<tr>
<td>6. Salience</td>
<td>SALT ([\eta_6])</td>
<td></td>
</tr>
<tr>
<td>7. Tension</td>
<td>TENS ([\eta_7])</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>8. Role Performance</td>
<td>PERT ( [\eta_8] )</td>
<td>( y_{81} )</td>
</tr>
<tr>
<td>9. Net Savings</td>
<td>NSAV ( [\eta_9] )</td>
<td>( y_{91} )</td>
</tr>
<tr>
<td>10. Net Operating Revenue</td>
<td>NORT ( [\eta_{10}] )</td>
<td>( y_{101} )</td>
</tr>
</tbody>
</table>

\(^a\)OV : Observed Variables,  
ME : Measurement Error,  
SE : Specification Error.

\(^b\)Subscripted symbols in square brackets correspond to the unobserved variables in Figure 7.
notational symbols used to describe the structural and measurement components of the model. The variables enclosed in boxes are unobserved true scores. Unobserved independent variables are designated by $\xi_i$ and unobserved dependent variables by $\eta_i$. The terms $x_{ij}$ and $y_{ij}$ refer accordingly to the indicators of the unobserved independent and dependent variables of the model; $\delta_{ij}$ is the measurement error for the observed independent variables and $\epsilon_{ij}$ is the measurement error for the observed dependent variables. Finally, $\zeta_i$ refers to the specification error for each respective endogenous variable in the model. The subscript $i$ when used with the exogenous variables of the model (observed and unobserved) refers to the variable and the respective measurement errors with $i = 1,2,3,4,5$. For the endogenous variables of the model either observed or unobserved, the subscript $i$ refers to the variable and associated measurement and specification errors with $i = 1,2,\ldots,10$. The subscript $j$ in either case refers to the indicator with $j = 1,2$.

The substantive portion of Figure 7 is a recursive model among the true values $\xi$ and $\eta$. Hence, the beta matrix is lower triangular. Another characteristic feature of the model is that the latent variables act as underlying causes of the observed variables. Measurement errors delta and epsilon and specification errors zeta are assumed to be uncorrelated among themselves and to each other.

The measurement model in Figure 7 represents the operationalization of the first 13 latent variables. Totally, it includes 26 indicators. The cooperative effectiveness model with the structural and measurement components in Figure 7 is the initial theoretical model analyzed with
the LISREL IV SUPER CARP and Least-Squares techniques. In testing this model, comparison of these three procedures is made only when role performance is used as an indicator of organizational effectiveness. Two reasons were considered for such a decision. First, in running the initial model with role performance as an operational expression of organizational effectiveness, the relevant computer costs were quite high due to the complexity of the model. At the same time, by using the initial specification of the model, approximately the same results may be obtained by using either the LISREL or the EIV procedures. Second, by respecifying the original model, it is possible to compare the three approaches, alternatively using the three indicators of organizational effectiveness, at a quite lower cost. However, during the first step, relevant findings with the other two indicators of organizational effectiveness, namely net savings and net operating revenue, are presented and discussed for both, the EIV and OLS procedures.

The specification of the model, first in terms of the LISREL approach and second in terms of the EIV approach, follows.

The LISREL specification of the structural component of the initial model of cooperative organizational effectiveness (Model I), in matrix notation for the unobserved variables has as follows
The LISREL specification of the measurement component of the initial model of cooperative organizational effectiveness (Model I), in matrix notation for the observed independent variables $x_{ij}$ is

$$
\begin{bmatrix}
1 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 1.0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 1.0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 \\
\end{bmatrix}
\begin{bmatrix}
\eta_1 \\
\eta_2 \\
\eta_3 \\
\eta_4 \\
\eta_5 \\
\eta_6 \\
\eta_7 \\
\eta_8 \\
\end{bmatrix}
= \begin{bmatrix}
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
\end{bmatrix}
\begin{bmatrix}
\xi_1 \\
\xi_2 \\
\xi_3 \\
\xi_4 \\
\xi_5 \\
\xi_6 \\
\xi_7 \\
\xi_8 \\
\end{bmatrix}

\text{(4.1)}

\begin{bmatrix}
1 & 0 & 0 & 0 & 0 & 0 \\
1 & 0 & 0 & 0 & 0 & 0 \\
0 & 1 & 0 & 0 & 0 & 0 \\
0 & 1 & 0 & 0 & 0 & 0 \\
0 & 0 & 1 & 0 & 0 & 0 \\
0 & 0 & 1 & 0 & 0 & 0 \\
0 & 0 & 0 & 1 & 0 & 0 \\
0 & 0 & 0 & 0 & 1 & 0 \\
0 & 0 & 0 & 0 & 0 & 1 \\
0 & 0 & 0 & 0 & 0 & 0 \\
\end{bmatrix}
\begin{bmatrix}
x_{11} \\
x_{12} \\
x_{21} \\
x_{22} \\
x_{31} \\
x_{32} \\
x_{41} \\
x_{42} \\
x_{51} \\
x_{52} \\
\end{bmatrix}
= \begin{bmatrix}
\Lambda_x \\
\end{bmatrix}
\begin{bmatrix}
\xi_1 \\
\xi_2 \\
\xi_3 \\
\xi_4 \\
\xi_5 \\
\xi_6 \\
\xi_7 \\
\xi_8 \\
\end{bmatrix}
+ \begin{bmatrix}
\delta_1 \\
\delta_2 \\
\delta_3 \\
\delta_4 \\
\delta_5 \\
\delta_6 \\
\delta_7 \\
\delta_8 \\
\end{bmatrix}
\text{(4.2)}
The LISREL specification of the measurement component of the initial model of cooperative organizational effectiveness (Model I), in matrix notation for the observed dependent variables $y_{ij}$ when role performance is used as an indicator of organizational effectiveness has as follows

\[
\begin{bmatrix}
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0
\end{bmatrix}
= 
\begin{bmatrix}
\eta_1 \\
\eta_2 \\
\eta_3 \\
\eta_4 \\
\eta_5 \\
\eta_6 \\
\eta_7 \\
\eta_8 \\
\bar{\epsilon}_{11} \\
\bar{\epsilon}_{12} \\
\bar{\epsilon}_{21} \\
\bar{\epsilon}_{22} \\
\bar{\epsilon}_{31} \\
\bar{\epsilon}_{32} \\
\bar{\epsilon}_{41} \\
\bar{\epsilon}_{42} \\
\bar{\epsilon}_{51} \\
\bar{\epsilon}_{52} \\
\bar{\epsilon}_{61} \\
\bar{\epsilon}_{62} \\
\bar{\epsilon}_{71} \\
\bar{\epsilon}_{72} \\
\bar{\epsilon}_{81} \\
\bar{\epsilon}_{82}
\end{bmatrix} 
\]

(4.3)

In short, the above measurement structure specifies that the $j$-th measure of the $i$-th variable, $x_{ij}$ and $y_{ij}$ is generated by the true score of that variable, $\xi_i$ or $\eta_i$ respectively, plus a response error, $\delta_{ij}$ or...
\( \varepsilon_{ij} \), which is independent of \( \xi_1 \) and \( \eta_1 \). Furthermore, a metric is established for the true scores by fixing \( \lambda_{ij} = 1 \) (\( i = 1,2,3,4,5 \) and \( u = 1,2 \)) in the case of unobserved exogenous variables \( \kappa_1 \) and \( \lambda_{ij} = 1 \) (\( i = 1,2,\ldots,8 \) and \( j = 1,2 \)) in the case of the true endogenous variables etc. This means that the metric of the true scores is the same. A normalization of this kind is required because the metric of an unobserved variable is arbitrary and as a result, the slope coefficients with respect to indicators are identifiable only relative to each other.

The structural equations of the theoretical model discussed in Chapter two, according to the Errors-in-Variables approach are given below:

\[
\begin{align*}
\eta_1 &= \gamma_{10} + \gamma_{13}\xi_3 + \gamma_{14}\xi_4 + \gamma_{15}\xi_5 + \xi_1 \\
\eta_2 &= \gamma_{20} + \gamma_{22}\xi_2 + \gamma_{23}\xi_3 + \gamma_{25}\xi_5 + \xi_2 \\
\eta_3 &= \beta_{32}\eta_2 + \gamma_{30} + \gamma_{31}\xi_1 + \gamma_{32}\xi_2 + \gamma_{33}\xi_3 + \gamma_{35}\xi_5 + \xi_3 \\
\eta_4 &= \beta_{41}\eta_1 + \beta_{42}\eta_2 + \beta_{43}\eta_3 + \xi_4 \\
\eta_5 &= \beta_{51}\eta_1 + \beta_{52}\eta_2 + \beta_{54}\eta_4 + \xi_5 \\
\eta_6 &= \beta_{64}\eta_4 + \beta_{65}\eta_5 + \gamma_{60} + \gamma_{62}\xi_2 + \xi_6 \\
\eta_7 &= \beta_{76}\eta_6 + \xi_7 \\
\eta_8 &= \beta_{11}\eta_1 + \beta_{12}\eta_2 + \beta_{13}\eta_3 + \beta_{14}\eta_4 + \beta_{15}\eta_5 + \beta_{16}\eta_6 + \beta_{17}\eta_7 \\
&\quad + \gamma_{10} + \gamma_{11}\xi_1 + \gamma_{12}\xi_2 + \xi_1 ;
\end{align*}
\]

where \( i = 8,9,10. \)
\( \gamma_{10} \): true slope of equation \( p \) (\( p = 1, 2, 3, \ldots, i \); \( i = 8, 9, 10 \)), and variable \( k \), where \( k \) represents \( \xi \) to \( \eta \) as described in Table 2. The \( \gamma \)'s are the unknown parameters to be estimated. As in the LISREL specification of the model, \( \xi \) refers to the errors in the equations (specification errors) while the lower case \( \xi \) and \( \eta \) refer to the true value of the variables, respectively. In the above equations \( \xi \) and \( \eta \) represent the unobserved variables of the model. In fact, we observe \( x \), which is the sum of \( \xi \) and the measurement error \( \delta \), and \( y \), which is the sum of \( \eta \) and the measurement error \( e \). All the assumptions that accompany the EIV procedure, discussed in Chapter Three, are also implied here.

The Ordinary Least-Squares regression was estimated by utilizing the Statistical Package of the Social Sciences (SPSS) program. The Errors-in-Variables regressions were estimated by utilizing the SUPER CARP program. Joreskog's estimates, in his method for the analysis of linear structural relationships by the method of maximum likelihood, were obtained by utilizing the LISREL IV computer program. LISREL IV allows a simultaneous estimation of all model parameters including correlated disturbances and the measurement structure. For LISREL IV, the variance-covariance matrix of the indicators was the basis of the data input. Through instructions built into the program the variance-covariance matrix was finally converted into a correlation matrix.

Table C.2 in Appendix C presents the Pearson correlation and variance-covariance matrix for Model I. The correlations are given above the diagonal, while diagonal elements represent the variances and below diagonal elements correspond to the covariances. For the SUPER CARP
program raw data were used as the input.

The LISREL model provides an opportunity to examine the fit of the hypothesized model to the data before parameter estimates can be interpreted in a meaningful way. Judgments about the adequacy of the fit can be determined in two ways: first, by calculating a $\chi^2$ measure of the goodness of fit and second, by observing the residual matrix obtained by subtracting the observed correlations from the correlations reproduced by the parameter estimates. At this stage of model testing, the first criterion will be utilized.

The closeness of $\chi^2$-value to the degrees of freedom is an especially useful intuitive guide to the adequacy of fit (Joreskog, 1971). The fit of the present model based on the LISREL findings appears to be reasonably good for such a complex model, based on the descriptive fit ratio. For a $\chi^2$ of 505.22 with 285 degrees of freedom, there is a ratio of 1.77 per degree of freedom. However, the probability of the model is far beyond .001. Before proceeding in suggesting respecification of this model in order to obtain a better fit, the OLS, EIV, and LISREL techniques will be compared on the basis of testing the initial theoretical model (Model I).

Table 3 presents the estimated coefficients under the OLS, EIV and LISREL approaches when role performance is used as the observed counterpart of organizational effectiveness. The numbers within parentheses are the standard errors of respective coefficients. Significant coefficients are marked by (*) or (**) to note that the coefficient is significant at the five or one percent level of statistical significance.
Table 3. Estimated coefficients for Model I with the OLS, EIV and LISREL procedures when role performance is used as an indicator of organizational cooperative effectiveness

<table>
<thead>
<tr>
<th>Equations</th>
<th>Procedures</th>
<th>OLS</th>
<th></th>
<th>EIV</th>
<th></th>
<th>LISREL</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>B</td>
<td>SE</td>
<td>B</td>
<td>SE</td>
<td>B</td>
<td>SE</td>
</tr>
<tr>
<td>STRD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MKPT</td>
<td>.068 (.094)</td>
<td>.047 (.087)</td>
<td>.056 (.091)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COMP</td>
<td>.004 (.023)</td>
<td>-.007 (.024)</td>
<td>-.015 (.030)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SIZE</td>
<td>1.074** (.098)</td>
<td>1.242** (.179)</td>
<td>1.330** (.117)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SCOP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COMP</td>
<td>.008 (.008)</td>
<td>.008 (.012)</td>
<td>.007 (.011)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SELT</td>
<td>.141* (.070)</td>
<td>.116 (.089)</td>
<td>.164 (.092)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SIZE</td>
<td>.168** (.036)</td>
<td>.187** (.042)</td>
<td>.198** (.044)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PERV</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CONS</td>
<td>.028* (.018)</td>
<td>.036 (.024)</td>
<td>.022 (.023)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SELT</td>
<td>.261** (.086)</td>
<td>.308** (.096)</td>
<td>.377** (.111)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COMP</td>
<td>.000 (.010)</td>
<td>.000 (.012)</td>
<td>-.004 (.012)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SIZE</td>
<td>.178** (.046)</td>
<td>.185** (.061)</td>
<td>.218** (.063)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SCOP</td>
<td>.168 (.099)</td>
<td>.227 (.174)</td>
<td>.158 (.172)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SOCL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>STRD</td>
<td>.023 (.040)</td>
<td>-.100 (.122)</td>
<td>-.090 (.066)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SCOP</td>
<td>.050 (.121)</td>
<td>.012 (.247)</td>
<td>-.020 (.233)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PERV</td>
<td>.365** (.105)</td>
<td>.882* (.402)</td>
<td>.872** (.230)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COMM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>STRD</td>
<td>.032 (.022)</td>
<td>.030 (.038)</td>
<td>.017 (.033)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SCOP</td>
<td>.061 (.075)</td>
<td>.069 (.145)</td>
<td>.080 (.130)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SOCL</td>
<td>.283** (.050)</td>
<td>-.667 (.468)</td>
<td>-.698 (.503)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a Abbreviations of variables are used as denoted in Table 2.

b B: Estimated coefficient; SE: Standard error.

* T-value significant at .05 level (two-tailed test).

** T-value significant at .01 level (two-tailed test).
Table 3 (Continued)

<table>
<thead>
<tr>
<th>Equations</th>
<th>OLS</th>
<th>EIV</th>
<th>LISREL</th>
</tr>
</thead>
<tbody>
<tr>
<td>SALT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SELT</td>
<td>.704* (.316)</td>
<td>.932* (.462)</td>
<td>.993* (.411)</td>
</tr>
<tr>
<td>SOCL</td>
<td>-.285 (.256)</td>
<td>-.667 (.467)</td>
<td>-.698 (.504)</td>
</tr>
<tr>
<td>COMM</td>
<td>.491 (.378)</td>
<td>1.035 (.697)</td>
<td>1.096 (.834)</td>
</tr>
<tr>
<td>TENS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SALT</td>
<td>-.142* (.061)</td>
<td>-.180* (.076)</td>
<td>-.171* (.078)</td>
</tr>
<tr>
<td>PFRT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CONS</td>
<td>-.015 (.019)</td>
<td>-.038 (.052)</td>
<td>.029 (.021)</td>
</tr>
<tr>
<td>SELT</td>
<td>.417** (.076)</td>
<td>.480** (.167)</td>
<td>.521** (.130)</td>
</tr>
<tr>
<td>STRD</td>
<td>.017 (.027)</td>
<td>-.025 (.090)</td>
<td>-.026 (.046)</td>
</tr>
<tr>
<td>SCOP</td>
<td>.028 (.082)</td>
<td>-.041 (.162)</td>
<td>-.089 (.149)</td>
</tr>
<tr>
<td>PERV</td>
<td>.163* (.075)</td>
<td>.351 (.342)</td>
<td>.304 (.228)</td>
</tr>
<tr>
<td>COMM</td>
<td>.222* (.089)</td>
<td>.354 (.235)</td>
<td>.358 (.200)</td>
</tr>
<tr>
<td>SOCL</td>
<td>.185** (.060)</td>
<td>.137 (.139)</td>
<td>.142 (.140)</td>
</tr>
<tr>
<td>SALT</td>
<td>-.251 (.023)</td>
<td>-.021 (.065)</td>
<td>-.039 (.027)</td>
</tr>
<tr>
<td>TENS</td>
<td>.114 (.025)</td>
<td>.013 (.063)</td>
<td>.022 (.041)</td>
</tr>
</tbody>
</table>

The significance of the estimates presented in Table 3 is based on the division of the estimate by its standard error. The resulting quantity follows student's t-distribution with n-k-1 degrees of freedom. The criteria t-value for 153 cases is 1.96 for the .05 alpha level and 2.57 for the .01 alpha level. Coefficients estimated by the LISREL method are maximum likelihood estimates. More complete information about the estimates is given in Appendix D, Tables D.1 through D.4.
Table 3 shows that both approaches, LISREL and EIV, have almost identical results. For both procedures the following three variables have proven to be significant for certain paths at least at the .05 level of statistical significance: selectivity, size, pervasiveness and salience. It appears also that most of the significant coefficients estimated by the LISREL procedure are on the average slightly higher in size than the corresponding coefficients estimated with the EIV procedure. The LISREL model handles, at the same time, structural coefficients, observed values and error considerations in a system of simultaneous equations for all dependent variables. Estimates of one coefficient automatically affect the estimates of the remainder. The EIV approach deals separately with each dependent variable in estimating coefficients; this is a good reason why these slight differences in the estimates of coefficients between these two procedures occur.

Regarding the OLS approach, it appears to systematically underestimate the magnitude of those paths that have proved significant at least for the .05 alpha level in comparison with the EIV and LISREL approaches. These findings agree with Aziz's (1978) findings and the more general argument that relationships are attenuated by measurement errors. Finally, a general point that can be made regarding the significant paths found is that all are in the direction hypothesized.

Among the paths leading to structural differentiation, only the coefficient of size is significant to explain structural differentiation at the .01 alpha level across the three solutions. Market potential and competition are not significant.
Size is also significantly related to scope at the .01 alpha level across the three approaches. The coefficient of selectivity is significant at the .05 alpha level in explaining scope only with the OLS approach. However, for the path from selectivity to scope, the t-values for the EIV and LISREL procedures are quite close to the critical value of 1.96. Competition has no significant effect on scope across all three solutions.

Among the exogenous and throughput variables hypothesized to influence pervasiveness, only the coefficients of size and selectivity are significant at the .01 alpha level across the three approaches. In addition, elite consensus is significant at the .05 alpha level in explaining pervasiveness with the OLS procedure. The paths from scope and competition do not interrelate with pervasiveness as anticipated with any of the three procedures.

Considering the paths that lead to socialization, only pervasiveness is significant at the .01 alpha level with the OLS and LISREL procedures and at the .05 alpha level with the EIV procedure. The estimated coefficients from structural differentiation and scope to pervasiveness are nonsignificant.

Among the paths hypothesized to lead to communication, only socialization appears to be significant at the .01 alpha level with the OLS procedure, but not with the EIV and LISREL procedures. The paths from scope and structural differentiation to communication are nonsignificant.

Selectivity is the only significant path at the .05 alpha level that leads to salience across all three procedures. The coefficients
of socialization and communication are nonsignificant. All the significant relationship discussed above are positive. The path from salience to tension, is in the predicted direction (negative), and significant with either of the three analysis procedures.

Finally, selectivity has a significant effect on role performance at the .01 alpha level across the three analysis procedures. In addition, with the OLS procedure the coefficients of pervasiveness, communication and socialization are significant to explain role performance. Estimates by the EIV and LISREL procedures are free of measurement error and represent true values reflecting the structure of relationships among the concepts of the theory. Estimates given by the OLS represent observed values and hence are attenuated by measurement errors.

Regarding nonsignificant paths, the direction of relationship is opposite to what was hypothesized for certain of them, depending on the variable considered and the relevant procedure followed. The path from socialization to salience falls into this category for the three approaches followed in this study. In addition, both the EIV and LISREL approaches suggest some further nonsignificant paths from competition to structural differentiation, from structural differentiation to socialization and from socialization to communication. These are negative although they had been hypothesized as positive. Only the LISREL procedure further indicates that the paths from scope to socialization and competition to pervasiveness are negative, despite the fact that these relationships were hypothesized as positive. Finally, consensus and salience, contrary to what was hypothesized, are negatively related to role
performance across all three solutions. Further negative relationships
to role performance are indicated only with the EIV and LISREL
approaches for the variables of structural differentiation and scope.
Generally, all these negative relationships are not significant. In
almost all the above cases, the size of the coefficients is low relative
to its standard error.

The present study focuses on the chi-square value provided by the
LISREL solution to test for the goodness of fit of the model. Accord­
ing to Bielby and Hauser (1977, p. 154) proportions of variance
explained have little, if any reference to the validity of structural
equation models. However, to further compare the three approaches con­
sidered in the context of the present study, the magnitude of respective
$R^2$ estimates are presented for the OLS, EIV and LISREL procedures in
Table 4. $R^2$ values for the EIV and LISREL solutions are not printed
out but must be calculated. The following two formulas are used to
obtain the respective estimates of $R^2$.

\[
EIV: R^2_{TRUE-y \text{ on } TRUE-x} = \frac{R^2_{y \text{ on } TRUE-x} (S^2_{y-\text{OBS}})}{S^2_{y-TRUE}} \tag{4.5}
\]

\[
LISREL: R^2_{TRUE-y \text{ on } TRUE-x} = 1 - \sigma^2_{\xi_i} \tag{4.6}
\]

where:

$R^2_{TRUE-y \text{ on } TRUE-x}$: is the explained true variation in $y$ by the
the true values of $x$'s

$R^2_{y \text{ on } TRUE-x}$: explained variation in $y$ by the true values
of $x$'s

$S^2_{y-\text{OBS}}$: observed variation in $y$
Table 4. Comparison between Ordinary Least Squares, Errors-in-Variables and LISREL estimates with respect to $R^2$ (Model I)

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>OLS</th>
<th>EIV</th>
<th>LISREL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural differentiation</td>
<td>.48</td>
<td>.73</td>
<td>.83</td>
</tr>
<tr>
<td>Scope</td>
<td>.20</td>
<td>.33</td>
<td>.35</td>
</tr>
<tr>
<td>Pervasiveness</td>
<td>.27</td>
<td>.49</td>
<td>.56</td>
</tr>
<tr>
<td>Socialization</td>
<td>.13</td>
<td>.29</td>
<td>.34</td>
</tr>
<tr>
<td>Communication</td>
<td>.23</td>
<td>.45</td>
<td>.46</td>
</tr>
<tr>
<td>Salience</td>
<td>.04</td>
<td>.09</td>
<td>.10</td>
</tr>
<tr>
<td>Tension</td>
<td>.03</td>
<td>.07</td>
<td>.06</td>
</tr>
<tr>
<td>Role performance</td>
<td>.48</td>
<td>.85</td>
<td>.85</td>
</tr>
<tr>
<td>Net savings</td>
<td>.24</td>
<td>.48</td>
<td>---</td>
</tr>
<tr>
<td>Net operating revenue</td>
<td>.49</td>
<td>.69</td>
<td>---</td>
</tr>
</tbody>
</table>

$S^2_y$ - TRUE : true variation in $y$

$\sigma^2_{\xi_1}$ : variance of specification error standardized

Observed variation of $y$'s and true variation of $y$'s can be obtained through available SPSS subprograms. Especially, true variation of the $y$'s can be estimated with the help of subprogram reliability (Table 1). True variance of a variable is the product of the reliability coefficient and the observed variance. The variance of specification error is
printed out in the LISREL model. Hence, it is a matter of simple cal-
culations to replace in Equations 4.5 and 4.6 the values of the respec-
tive variables and obtain estimates of EIV and LISREL $R^2$. These comput-
tations may be examined in Appendix E.

Table 4 shows that EIV and LISREL $R^2$ corresponding to the endog-
enous variables of the model in phase one are considerably larger than
the OLS $R^2$. Aziz (1978, p. 108) presents two reasons justifying the
higher $R^2$ obtained with the EIV in contrast to the OLS approach his argu-
ment can also be extended for the LISREL approach. First, the explained
variation in $y$ is computed from the true variance in $y$ deducted by the
error in the equation. In the case of OLS we deduct in addition the
errors of measurement. Second, the denominator of the EIV $R^2$ is the
ture variance in $y$ which is smaller than the total sample variance, the
denominator of the OLS $R^2$. In LISREL $R^2$ was estimated by subtracting
the standardized variance of specification error of $y$ from one. This
is equivalent to the formula in which the nominator consists of the
ture variation in $y$ deducted by the error in the equation and the
denominator consists of the true variation in $y$.

LISREL $R^2$ are generally higher than the EIV $R^2$, except for the
equation in which tension is the dependent variable. When role per-
formance is the dependent variable both $R^2$ are equal, within rounding
error, of course. LISREL estimates are maximum likelihood estimates and
hence, make a more efficient use of all the information available for
computing estimates, thus the slight differences that appear between
EIV and LISREL procedures results. Interpreting these $R^2$ estimates, it
appears that 85 percent of the true variation in role performance is explained by the true variation of respective independent variables. In the case of OLS, 48 percent of the observed variation in role performance is explained by the observed values of respective independent variables in the model.

Table 5 further presents the results of testing the original model with the OLS and EIV approaches when net savings and net operating revenue are used as indicators of organizational effectiveness. In both procedures, structural differentiation is significant but at varying alpha levels (.05 and .01) in predicting net savings and net operating revenue. In addition, the coefficient of salience is significant at the .01 alpha level to explain net savings and the coefficients of scope and salience are significant at the .05 alpha level to explain net operating revenue.

Relationships that are nonsignificant, but in a direction opposite to that hypothesized, are indicated by both procedures. Consensus, pervasiveness, tension and communication are negatively related to net savings, while further communication is negatively related to net operating revenue. However, some differences are evident between the two procedures. Pervasiveness is negatively related to net operating revenue with the EIV procedure, while consensus and salience are negatively related to net operating revenue with the OLS procedure.

Considering the descriptive fit ratio for this model (1.77) and the probability level, which is quite low for the $x^2$ distribution, it appears that there is certainly room for improvement with such a complex model.
Table 5. Estimated coefficients of the cooperative effectiveness model (Model I) when net savings and net operating revenue are used as indicators of effectiveness

<table>
<thead>
<tr>
<th>Equations</th>
<th>OLS</th>
<th>EIV</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NSAV</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CONS</td>
<td>-.064 (.040)</td>
<td>-.010 (.125)</td>
</tr>
<tr>
<td>SELT</td>
<td>.007 (.160)</td>
<td>.116 (.310)</td>
</tr>
<tr>
<td>STRD</td>
<td>.203** (.056)</td>
<td>.454* (.203)</td>
</tr>
<tr>
<td>SCOP</td>
<td>.107 (.172)</td>
<td>.000 (.349)</td>
</tr>
<tr>
<td>PERV</td>
<td>-.187 (.156)</td>
<td>-.094 (.794)</td>
</tr>
<tr>
<td>COMM</td>
<td>-.275 (.187)</td>
<td>-.628 (.479)</td>
</tr>
<tr>
<td>SOCT</td>
<td>.103 (.126)</td>
<td>.386 (.329)</td>
</tr>
<tr>
<td>SALT</td>
<td>.207** (.047)</td>
<td>.291 (.139)</td>
</tr>
<tr>
<td>TENS</td>
<td>-.050 (.052)</td>
<td>-.041 (.108)</td>
</tr>
<tr>
<td><strong>NORT</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CONS</td>
<td>-.012 (.035)</td>
<td>.055 (.128)</td>
</tr>
<tr>
<td>SELT</td>
<td>.204 (.141)</td>
<td>.482 (.334)</td>
</tr>
<tr>
<td>STRD</td>
<td>.385** (.049)</td>
<td>.753** (.240)</td>
</tr>
<tr>
<td>SCOP</td>
<td>.333* (.152)</td>
<td>.350 (.348)</td>
</tr>
<tr>
<td>PERV</td>
<td>.035 (.138)</td>
<td>-.884 (.893)</td>
</tr>
<tr>
<td>COMM</td>
<td>-.239 (.165)</td>
<td>-.626 (.548)</td>
</tr>
<tr>
<td>SOCT</td>
<td>-.065 (.111)</td>
<td>.112 (.378)</td>
</tr>
<tr>
<td>SALT</td>
<td>.088* (.042)</td>
<td>.024 (.128)</td>
</tr>
<tr>
<td>TENS</td>
<td>-.067 (.046)</td>
<td>-.166 (.100)</td>
</tr>
</tbody>
</table>

*a Abbreviations of variables are used as denoted in Table 2.

* T-value significant at .05 level (two-tailed test).

** T-value significant at .01 level (two-tailed test).

McPherson et al. (1977, p. 516) note that the $x^2$ statistic will be useful in such cases to compare different models rather than to evaluate the absolute fit of any single model. The $x^2$ value produced by the different models generated in this study will be used for this comparative purpose. $x^2$ is a function of the discrepancies between the actual
variance-covariance matrix and the variance-covariance matrix implied by the measurement model. Hence, the better the fit, the smaller the \( \frac{x^2}{\text{per degree of freedom}} \). An examination of Table 3 indicates that the fit of model to the data could be improved by deleting the nonsignificant paths. This is the first kind of specification suggested by the LISREL IV analysis for revising the original model. These paths can be manipulated by fixing to zero the respective coefficients in the gamma and beta matrices of LISREL. It is noted that the former matrix refers to the paths from the independent to the dependent latent variables. The latter matrix consists of the paths among the dependent latent variables. In the original model, the large number of unknowns contributes to the complexity of the model. By fixing certain paths to be equal to zero, the number of unknowns is reduced and hence the complexity of the simultaneous equation systems that have to be solved is also reduced (Evers, 1979).

Model II

The structural and measurement components of Model II in Figure 8 represent the respecified model of cooperative organizational effectiveness according to the LISREL procedure after deleting the nonsignificant paths.

Figure 8 implies a recursive model in which the latent variables act as underlying causes of the observed variables. Measurement errors and specification errors are assumed to be uncorrelated to each other and among themselves. Table 6 provides a summary of the notational
Figure 8. Model II of cooperative organization
cooperative organizational effectiveness (LISREL specification).
Table 6. Summary of the structural and measurement aspects of the revised model of cooperative organizational effectiveness (Model II)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Structural component abbreviations</th>
<th>Measurement component&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>OV</td>
</tr>
<tr>
<td><strong>A. Independent</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Market potential</td>
<td>MKPT [ξ&lt;sub&gt;1&lt;/sub&gt;]&lt;sup&gt;b&lt;/sup&gt;</td>
<td>x&lt;sub&gt;11&lt;/sub&gt;</td>
</tr>
<tr>
<td>2. Selectivity</td>
<td>SELT [ξ&lt;sub&gt;2&lt;/sub&gt;]</td>
<td>x&lt;sub&gt;21&lt;/sub&gt;</td>
</tr>
<tr>
<td>3. Size</td>
<td>SIZE [ξ&lt;sub&gt;3&lt;/sub&gt;]</td>
<td>x&lt;sub&gt;31&lt;/sub&gt;</td>
</tr>
<tr>
<td><strong>B. Dependent</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Structural differentiation</td>
<td>STRD [η&lt;sub&gt;1&lt;/sub&gt;]</td>
<td>y&lt;sub&gt;11&lt;/sub&gt;</td>
</tr>
<tr>
<td>2. Scope</td>
<td>SCOP [η&lt;sub&gt;2&lt;/sub&gt;]</td>
<td>y&lt;sub&gt;21&lt;/sub&gt;</td>
</tr>
<tr>
<td>3. Pervasiveness</td>
<td>PERV [η&lt;sub&gt;3&lt;/sub&gt;]</td>
<td>y&lt;sub&gt;31&lt;/sub&gt;</td>
</tr>
<tr>
<td>4. Socialization</td>
<td>SOCL [η&lt;sub&gt;4&lt;/sub&gt;]</td>
<td>y&lt;sub&gt;41&lt;/sub&gt;</td>
</tr>
<tr>
<td>5. Communication</td>
<td>COMM [η&lt;sub&gt;5&lt;/sub&gt;]</td>
<td>y&lt;sub&gt;51&lt;/sub&gt;</td>
</tr>
<tr>
<td>6. Salience</td>
<td>SALT [η&lt;sub&gt;6&lt;/sub&gt;]</td>
<td>y&lt;sub&gt;61&lt;/sub&gt;</td>
</tr>
<tr>
<td>7. Tension</td>
<td>TENS [η&lt;sub&gt;7&lt;/sub&gt;]</td>
<td>y&lt;sub&gt;71&lt;/sub&gt;</td>
</tr>
<tr>
<td>8. Role performance</td>
<td>PFRT [η&lt;sub&gt;8&lt;/sub&gt;]</td>
<td>y&lt;sub&gt;81&lt;/sub&gt;</td>
</tr>
<tr>
<td>9. Net saving</td>
<td>NSAV [η&lt;sub&gt;9&lt;/sub&gt;]</td>
<td>y&lt;sub&gt;91&lt;/sub&gt;</td>
</tr>
<tr>
<td>10. Net operating revenue</td>
<td>NORT [η&lt;sub&gt;10&lt;/sub&gt;]</td>
<td>y&lt;sub&gt;101&lt;/sub&gt;</td>
</tr>
</tbody>
</table>

<sup>a</sup>OV : Observed Variables,  
ME : Measurement Error,  
SE : Specification Error.

<sup>b</sup>Subscripted symbols in square brackets correspond to the unobserved variables in Figure 8.
symbols used to describe the model in Figure 8. Although the meaning of the symbols is that presented for the initial model, the values of subscript i have changed due to the reduced number of the variables in the present model. The values of i for the observed and unobserved independent variables and respective measurement errors range from one to three. For the corresponding dependent variables, measurement and specification errors, the values of i range from one to ten. During this step, all the alternative models are compared across the three analysis procedures using as indicators of the cooperative organizational effectiveness role performance, net savings and net operating revenue.

The specification of Model II, first in terms of the LISREL procedure and second in terms of the EIV procedure follows.

The LISREL specification of the structural equations of the revised model of cooperative organizational effectiveness (Model II), in matrix notation, when role performance is used as an indicator of effectiveness is as follows
The LISREL specification of the structural equations of the revised model of cooperative organizational effectiveness (Model II), in matrix notation, when net savings is used as an indicator of effectiveness is

\[
\begin{bmatrix}
1.0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & \beta_{43} & 1 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & \beta_{54} & 1 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & \beta_{76} & 1 & 0 & 0 \\
0 & 0 & \beta_{83} & 0 & \beta_{85} & 0 & 0 & 1 \\
1 & 0 & 0 & 0 & 0 & 0 & 0 & 0
\end{bmatrix}
\begin{bmatrix}
\eta_1 \\
\eta_2 \\
\eta_3 \\
\eta_4 \\
\eta_5 \\
\eta_6 \\
\eta_7 \\
\eta_8 \\
\eta_9
\end{bmatrix}
= 
\begin{bmatrix}
0 & \gamma_{13} \\
0 & \gamma_{22} & \gamma_{23} \\
0 & \gamma_{32} & \gamma_{33} \\
0 & 0 & 0 \\
0 & 0 & 0 \\
0 & \gamma_{62} & 0 \\
0 & 0 & 0 \\
0 & \gamma_{82} & 0 \\
0 & \gamma_{91} & 0 & 0
\end{bmatrix}
\begin{bmatrix}
\xi_1 \\
\xi_2 \\
\xi_3 \\
\xi_4 \\
\xi_5 \\
\xi_6 \\
\xi_7 \\
\xi_8 \\
\xi_9
\end{bmatrix}
+ 
\begin{bmatrix}
\zeta_1 \\
\zeta_2 \\
\zeta_3 \\
\zeta_4 \\
\zeta_5 \\
\zeta_6 \\
\zeta_7 \\
\zeta_8 \\
\zeta_9
\end{bmatrix}
\] (4.7)

Subscripts of coefficients in matrices gamma and ksi correspond to those in Table 6 and they do not reflect their actual order in the respective matrices.

Subscript nine corresponds to net savings in Table 6.

\[
\begin{bmatrix}
1.0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & \beta_{43} & 1 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & \beta_{54} & 1 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & \beta_{76} & 1 & 0 & 0 \\
0 & 0 & \beta_{83} & 0 & \beta_{85} & 0 & 0 & 1 \\
\beta_{91} & 0 & 0 & 0 & 0 & \beta_{96} & 0 & 1
\end{bmatrix}
\begin{bmatrix}
\eta_1 \\
\eta_2 \\
\eta_3 \\
\eta_4 \\
\eta_5 \\
\eta_6 \\
\eta_7 \\
\eta_8 \\
\eta_9
\end{bmatrix}
= 
\begin{bmatrix}
0 & 0 & \gamma_{13} \\
0 & \gamma_{22} & \gamma_{23} \\
0 & \gamma_{32} & \gamma_{33} \\
0 & 0 & 0 \\
0 & 0 & 0 \\
0 & \gamma_{62} & 0 \\
0 & 0 & 0 \\
0 & \gamma_{82} & 0 \\
0 & \gamma_{91} & 0 & 0
\end{bmatrix}
\begin{bmatrix}
\xi_1 \\
\xi_2 \\
\xi_3 \\
\xi_4 \\
\xi_5 \\
\xi_6 \\
\xi_7 \\
\xi_8 \\
\xi_9
\end{bmatrix}
+ 
\begin{bmatrix}
\zeta_1 \\
\zeta_2 \\
\zeta_3 \\
\zeta_4 \\
\zeta_5 \\
\zeta_6 \\
\zeta_7 \\
\zeta_8 \\
\zeta_9
\end{bmatrix}
\] (4.8)
The LISREL specification of the structural equations of the revised model of cooperative organizational effectiveness (Model II), in matrix notation, when net operating revenue is used an an indicator of effectiveness is presented below.

\[
\begin{bmatrix}
1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & \beta_{43} & 1 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & \beta_{54} & 1 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & \beta_{76} & 1 & 0 \\
\beta_{101} & 0 & 0 & 0 & 0 & \beta_{106} & 0 & 1 \\
\end{bmatrix}
\begin{bmatrix}
\eta_1 \\
\eta_2 \\
\eta_3 \\
\eta_4 \\
\eta_5 \\
\eta_6 \\
\eta_7 \\
\eta_{10} \\
\end{bmatrix}
\begin{bmatrix}
\gamma_{13} \\
\gamma_{22} \\
\gamma_{32} \\
0 \\
0 \\
\gamma_{62} \\
0 \\
0 \\
\end{bmatrix}
\begin{bmatrix}
1 \\
1 \\
1 \\
1 \\
1 \\
1 \\
1 \\
1 \\
\end{bmatrix}
\begin{bmatrix}
\xi_2 \\
\xi_3 \\
\xi_4 \\
\xi_5 \\
\xi_6 \\
\xi_7 \\
\xi_{10} \\
\end{bmatrix}
\]

The LISREL specification of the measurement equations of the revised model of cooperative organizational effectiveness (Model II), in matrix notation, for the observed independent variables $x_{ij}$ when net operating revenue and role performance are used as indicators of effectiveness is as follows:

\[
\begin{bmatrix}
\beta_{101} \\
\end{bmatrix}
\begin{bmatrix}
0 & 0 & 0 & 0 & \beta_{106} & 0 & 1 \\
\end{bmatrix}
\begin{bmatrix}
\eta_{10} \\
0 \\
0 \\
0 \\
\end{bmatrix}
\begin{bmatrix}
\xi_3 \\
\xi_{10} \\
\end{bmatrix}
\]

---

1. Subscripts of coefficients in matrices gamma and ksi correspond to those in Table 6 and they do not reflect their actual order in the respective matrices.

2. Subscript ten corresponds to net operating revenue in Table 6.
The LISREL specification of the measurement component of the revised model of cooperative organizational effectiveness (Model II), in matrix notation, for the observed independent variables $x_{ij}$ when net savings is used as an indicator of effectiveness is as follows:

\[
\begin{bmatrix}
    x_{21} \\
    x_{22} \\
    x_{31} \\
    x_{32}
\end{bmatrix}
= \begin{bmatrix}
    1 & 0 & 0 \\
    1 & 0 & 0 \\
    0 & 1 & 0 \\
    0 & 1 & 0
\end{bmatrix}
\begin{bmatrix}
    \xi_2 \\
    \xi_3
\end{bmatrix}
+ \begin{bmatrix}
    \delta_{21} \\
    \delta_{22} \\
    \delta_{31} \\
    \delta_{32}
\end{bmatrix}
\]

\[
(4.10)
\]

Subscripts of coefficients in matrices $\chi$, $\kappa$ and $\delta$ correspond to those in Table 6 and they do not reflect their actual order in the respective matrices.
It should be noted that the LISREL specification of the measurement model for the observed dependent variables $y_{ij}$ is the same as in Model I, regardless of which indicator of organizational effectiveness is used. Hence, it appears redundant to respecify this aspect of the measurement component of Model II. When role performance is used as an indicator of cooperative organizational effectiveness, the following structural equations specify Model II with the EIV procedure.

\[
\eta_1 = \gamma_{10} + \gamma_{13}\xi_3 + \zeta_1 \\
\eta_2 = \gamma_{20} + \gamma_{22}\xi_2 + \gamma_{23}\xi_3 + \zeta_2 \\
\eta_3 = \gamma_{30} + \gamma_{32}\xi_2 + \gamma_{33}\xi_3 + \zeta_3 \\
\eta_4 = \beta_{43}\eta_3 + \zeta_4 \tag{4.12} \\
\eta_5 = \beta_{54}\eta_4 + \zeta_5 \\
\eta_6 = \gamma_{60} + \gamma_{62}\xi_2 + \zeta_6 \\
\eta_7 = \beta_{76}\eta_6 + \zeta_7 \\
\eta_8 = \beta_{83}\eta_3 + \beta_{85}\eta_5 + \gamma_{80} + \gamma_{82}\xi_2 + \zeta_8
\]

The specification of Model II according to the EIV procedure is given below. First, the structural equations are quoted when net savings is used to operationalize organizational effectiveness.

When net savings is used to operationalize organizational effectiveness the following equations specify Model II with the EIV procedure.
Finally, when net operating revenue is used as an indicator of cooperative effectiveness, the following structural equations specify Model II with the EIV procedure.

\[ \eta_1 = \gamma_{10} + \gamma_{13} \xi_3 + \xi_1 \]

\[ \eta_2 = \gamma_{20} + \gamma_{22} \xi_2 + \gamma_{23} \xi_3 + \xi_2 \]

\[ \eta_3 = \gamma_{30} + \gamma_{32} \xi_2 + \gamma_{33} \xi_3 + \xi_3 \]

\[ \eta_4 = \beta_{43} \eta_3 + \xi_4 \]

\[ \eta_5 = \beta_{54} \eta_4 + \xi_5 \]

\[ \eta_6 = \gamma_{60} + \gamma_{62} \xi_2 + \xi_6 \]

\[ \eta_7 = \beta_{76} \eta_6 + \xi_7 \]

\[ \eta_9 = \beta_{91} \eta_1 + \beta_{96} \eta_6 + \gamma_9 + \gamma_{91} \xi_1 + \xi_9 \]

(4.13)

(4.14)
Before comparing the estimated coefficients of Model II across the LISREL, EIV and OLS procedures in order to make this comparison more meaningful, an interpretation of the fit of the model to the data based on the LISREL findings is presented.

Improvement in the fit of Model I seems evident when nonsignificant variables are deleted from the predictive equations. The use of chi-square in this case is "heuristic," since the model of Figure 8 is not an exact statistical alternative to the model of Figure 7 ($x^2 = 505.22$). Allowing this alternative model—with role performance used to measure effectiveness—reduces the $x^2$ to 265.04 with 177 degrees of freedom, for a ratio of 1.494. This is apparently a much better fit compared with the 1.77 of the initial model. Furthermore, the difference between the initial value of $x^2$ and that in the present model is 240.17. At 108 degrees of freedom, which is the difference between the degrees of freedom of the two models, this is clearly a statistically significant improvement. According to Joreskog and Sorbom (1979, p. 15) the improvement in the fit of the model is done without capitalizing on chance, since the change in the $x^2$ value is more than twice the change in degrees of freedom. Notice, however, that even the "reduced" model does not fit the data very well. With an $x^2$ of 265.04 and 177 degrees of freedom and also with a probability level well beyond .001, it is clear that the model does not provide a perfect representation of the causal structure in the data. Discussion in respecifying Model II in hopes of getting a better fit to the data is delayed until the findings in Table 7 are compared.
Table 7. Estimated coefficients of Model II with the OLS, EIV and LISREL procedures and the three alternative indicators of cooperative organizational effectiveness

<table>
<thead>
<tr>
<th>Equations</th>
<th>OLS</th>
<th>EIV</th>
<th>LISREL</th>
<th>PFRT</th>
<th>NSAV</th>
<th>NORT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>SE</td>
<td>B</td>
<td>SE</td>
<td>B</td>
<td>SE</td>
</tr>
<tr>
<td>STRD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SIZE</td>
<td>1.090** (.093)</td>
<td>1.245** (.167)</td>
<td>1.308** (.109)</td>
<td>1.324** (.100)</td>
<td>1.255** (.093)</td>
<td></td>
</tr>
<tr>
<td>SCOPE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SELT</td>
<td>.146* (.070)</td>
<td>.173* (.088)</td>
<td>.178* (.090)</td>
<td>.179 (.022)</td>
<td>.213* (.091)</td>
<td></td>
</tr>
<tr>
<td>SIZE</td>
<td>.176** (.035)</td>
<td>.197** (.040)</td>
<td>.208** (.041)</td>
<td>.203** (.041)</td>
<td>.170** (.038)</td>
<td></td>
</tr>
<tr>
<td>PEPV</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SELT</td>
<td>.298** (.085)</td>
<td>.367** (.096)</td>
<td>.425** (.107)</td>
<td>.419** (.108)</td>
<td>.463** (.109)</td>
<td></td>
</tr>
<tr>
<td>SIZE</td>
<td>.214** (.043)</td>
<td>.235** (.048)</td>
<td>.236** (.048)</td>
<td>.238** (.048)</td>
<td>.184** (.045)</td>
<td></td>
</tr>
<tr>
<td>SOCL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PERV</td>
<td>.412** (.088)</td>
<td>.660** (.155)</td>
<td>.681** (.136)</td>
<td>.672** (.138)</td>
<td>.680* (.140)</td>
<td></td>
</tr>
<tr>
<td>COMM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SOCL</td>
<td>.308** (.048)</td>
<td>.408** (.078)</td>
<td>.435** (.065)</td>
<td>.422** (.067)</td>
<td>.421** (.067)</td>
<td></td>
</tr>
<tr>
<td>SALT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SELT</td>
<td>.704* (.297)</td>
<td>.899* (.372)</td>
<td>.763* (.376)</td>
<td>.831* (.379)</td>
<td>.851* (.379)</td>
<td></td>
</tr>
<tr>
<td>TENS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SALT</td>
<td>-.142* (.061)</td>
<td>-.180* (.076)</td>
<td>-.174* (.078)</td>
<td>-.181* (.077)</td>
<td>-.181* (.078)</td>
<td></td>
</tr>
<tr>
<td>PFRT</td>
<td>SELT</td>
<td>.442** (.076)</td>
<td>.499** (.128)</td>
<td>.490** (.119)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>--------</td>
<td>---------------</td>
<td>---------------</td>
<td>---------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PERV</td>
<td>.230** (.065)</td>
<td>.311* (.126)</td>
<td>.251 (.134)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>COMM</td>
<td>.315** (.083)</td>
<td>.409* (.159)</td>
<td>.573** (.145)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NSAV</th>
<th>MKPT</th>
<th>.281** (.068)</th>
<th>.269* (.108)</th>
<th>.250** (.063)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>STRD</td>
<td>.139** (.044)</td>
<td>.179** (.054)</td>
<td>.347** (.058)</td>
</tr>
<tr>
<td></td>
<td>SALT</td>
<td>.153** (.039)</td>
<td>.188** (.049)</td>
<td>.167** (.043)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NORT</th>
<th>STRD</th>
<th>.409** (.041)</th>
<th>.547** (.072)</th>
<th>.863** (.067)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SALT</td>
<td>.029** (.035)</td>
<td>.104** (.043)</td>
<td>.070** (.020)</td>
</tr>
</tbody>
</table>

---

*a* Abbreviations of variables are used as denoted in Table 6.

*b* Estimated Coefficients, SE: Standard Error.

*T*-value significant at .05 level (two-tailed test).

**T*-value significant at .01 level (two-tailed test).
In terms of the information provided in Table 7, the obvious pattern is that almost all variables have proved to be significant and in the direction predicted in the initial theoretical model (Model I) under the three techniques. With a few exceptions, coefficients estimated with the EIV and LISREL approaches tend to be higher than with the OLS approach. These findings again reemphasize the attenuating effects of measurement errors on the relationships examined. The only exceptions concern the LISREL procedure when net operating revenue is used as an indicator of organizational effectiveness. In this case, the estimated coefficients from size to scope, size to pervasiveness, and salience to net operating revenue, although significant, are smaller in size than corresponding estimates with the EIV and OLS procedures. Since LISREL estimates are full information maximum likelihood estimates and hence more efficient, it appears that the Least-Square approach overestimates the respective coefficients. Bohrnstedt and Carter (1971) have noted that errors of measurement in multivariate analysis may lead Least-Squares to either overestimate or underestimate the coefficients. Also, Warren et al. (1974, p. 891) noted in their study that once EIV estimate was less than the corresponding OLS estimate.

Two exceptions also appear regarding the pattern observed in Model I in which standard errors estimated by the EIV and LISREL procedures were higher in comparison to the standard errors estimated by the OLS procedure. These exceptions again concern the LISREL solution in which the standard errors from market potential to net savings and from salience to net operating revenue are smaller than corresponding
standard error estimates of the EIV and OLS solutions. It appears also that under the LISREL procedure and with net savings as indicator of organizational effectiveness, the coefficient of selectivity is not significant in explaining scope, as with the OLS and EIV procedures, although its t-value (1.95) is quite close to the critical t-value (1.96). The full-information procedures utilized in the LISREL model seem to account for these results. For instance, the forementioned path from selectivity to scope is significant at the .05 alpha level with the LISREL model when role performance and especially net operating revenue are used as indicators of organizational effectiveness.

Another distinguishable feature of the LISREL procedure evident in Table 7 is that estimates of each respective coefficient change whenever a different indicator of cooperative organizational effectiveness is used. However, this is not the case with the OLS or EIV procedure, due to the fact that in the LISREL approach structural and measurement equations are dealt with as a system. Changing the parameter of effectiveness affects estimates of all the remaining parameters.

Coefficients estimated by the EIV and LISREL approaches do not seem to present any explicit distinguishable pattern. Depending on the case being examined, maximum likelihood estimates by the LISREL model may be higher or lower than corresponding regression estimates by the EIV model.

In short, Figure 8 summarizes in a meaningful way all the significant relationships leading from the exogenous variables (size, environment and input variables) to the throughput variables of the model or among the throughput variables themselves.
Regarding the paths leading to the output effectiveness variables, the following patterns are observed. The level of statistical significance reached is identical (.01 alpha level) for all three approaches and paths leading to net operating revenue which is used as one of the indicators of organizational effectiveness. Similar findings are observed when net savings is used to measure effectiveness except for the path from market potential to net savings under the EIV procedure which is significant only at the .05 alpha level.

When organizational effectiveness is indicated by role performance, pervasiveness proves to be nonsignificant with the LISREL approach but the respective t-value is 1.87 and hence quite close to the critical t-value for the .05 level of statistical significance. Some other differences are also noticed across the three procedures in terms of the level of statistical significance reached for certain paths leading to the three alternative indicators of organizational effectiveness. With the Ordinary Least-Squares approach all the relevant paths appear to be significant at the .01 level of statistical significance. On the other hand, with the EIV procedure the paths from pervasiveness and communication to role performance and the already mentioned path from market potential to net savings are only significant at the .05 level.

Table 8 presents the $R^2$ of OLS, EIV and LISREL approaches for Model II. It is evident in Table 8 that the EIV and LISREL $R^2$ corresponding to the respective endogenous variables of Model II, are again larger than the OLS $R^2$. Since during this phase the LISREL solution was applied alternatively to the three indicators of organizational effectiveness,
three different estimates of \( R^2 \) have been obtained for each respective endogenous variable in the model under the LISREL solution. It appears that there exists a certain amount of variation among these estimates, especially when structural differentiation is the dependent variable. These variations in the LISREL estimates of \( R^2 \) are due to the fact that all parameters in the LISREL model are examined and estimated as a system (structural equation model and measurement model). Hence, changes in the parameter of effectiveness influence again the estimate of all the rest parameters.

When net operating revenue is the dependent variable the three estimates of \( R^2 \) with the LISREL procedure are less than the corresponding estimates with the EIV procedure. These estimates correspond to the dependent variables of scope, pervasiveness and salience. Also, when salience is the dependent variable and net savings or role performance are used to measure effectiveness an \( R^2 \) estimate for LISREL less than the corresponding estimate for EIV is obtained but with a very narrow margin (.01).

Although the revised model (Model II) fits the data better than the original model as indicated by the reduced \( x^2 \) value, the fact that this value is substantially larger than the degrees of freedom indicates that the fit is still inadequate. The LISREL model provides the matrix of unexplained residuals which is the covariance matrix produced by the model minus the input covariance matrix. It has been noted that this feature produces information which can be useful in respecifying the present model. In the case of Model II, this can be done by freeing up
Table 8. Comparison between Ordinary Least-Squares, Errors-in-Variables and LISREL estimates with respect to $R^2$ in Model II

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>OLS</th>
<th>EIV</th>
<th>LISREL NORT</th>
<th>LISREL NSAV</th>
<th>LISREL PFRT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Structural differentiation</td>
<td>.47</td>
<td>.73</td>
<td>.87</td>
<td>.99</td>
<td>.78</td>
</tr>
<tr>
<td>2. Scope</td>
<td>.20</td>
<td>.33</td>
<td>.29</td>
<td>.35</td>
<td>.36</td>
</tr>
<tr>
<td>3. Pervasiveness</td>
<td>.25</td>
<td>.46</td>
<td>.44</td>
<td>.51</td>
<td>.50</td>
</tr>
<tr>
<td>4. Socialization</td>
<td>.13</td>
<td>.27</td>
<td>.29</td>
<td>.28</td>
<td>.29</td>
</tr>
<tr>
<td>5. Communication</td>
<td>.21</td>
<td>.43</td>
<td>.45</td>
<td>.45</td>
<td>.51</td>
</tr>
<tr>
<td>6. Salience</td>
<td>.04</td>
<td>.06</td>
<td>.05</td>
<td>.05</td>
<td>.04</td>
</tr>
<tr>
<td>7. Tension</td>
<td>.03</td>
<td>.07</td>
<td>.07</td>
<td>.07</td>
<td>.07</td>
</tr>
<tr>
<td>8. Role performance</td>
<td>.42</td>
<td>.77</td>
<td>---</td>
<td>---</td>
<td>.79</td>
</tr>
<tr>
<td>9. Net savings</td>
<td>.29</td>
<td>.38</td>
<td>---</td>
<td>.50</td>
<td>---</td>
</tr>
<tr>
<td>10. Net operating revenue</td>
<td>.59</td>
<td>.90</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>

$^a$ NORT: Net Operating Revenue.

$^b$ NSAV: Net Savings.

$^c$ PFRT: Role Performance.

restricted parameters; that is, whenever there are high unexplained residuals, arrows are added. Given the above considerations, an examination of the residuals produced with the revised Model II in Table 9 suggests that the following arrows have to be added: first, between structural differentiation and pervasiveness; second, between structural differentiation and salience; third, between size and salience; fourth,
Table 9. Residuals for Model II when role performance is used to measure effectiveness

<table>
<thead>
<tr>
<th></th>
<th>$y_{11}$</th>
<th>$y_{12}$</th>
<th>$y_{21}$</th>
<th>$y_{22}$</th>
<th>$y_{31}$</th>
<th>$y_{32}$</th>
<th>$y_{41}$</th>
<th>$y_{42}$</th>
<th>$y_{51}$</th>
<th>$y_{52}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$y_{11}$</td>
<td>0.047</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$y_{12}$</td>
<td>0.000</td>
<td>-0.047</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$y_{21}$</td>
<td>0.033</td>
<td>0.009</td>
<td>0.034</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$y_{22}$</td>
<td>0.019</td>
<td>0.018</td>
<td>0.000</td>
<td>-0.034</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$y_{31}$</td>
<td>0.252</td>
<td>0.271</td>
<td>0.042</td>
<td>0.027</td>
<td>0.047</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$y_{32}$</td>
<td>0.038</td>
<td>0.023</td>
<td>0.014</td>
<td>-0.039</td>
<td>-0.003</td>
<td>-0.047</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$y_{41}$</td>
<td>0.105</td>
<td>-0.075</td>
<td>0.008</td>
<td>0.002</td>
<td>-0.007</td>
<td>-0.022</td>
<td>-0.049</td>
<td></td>
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</tr>
<tr>
<td>$y_{42}$</td>
<td>0.061</td>
<td>0.001</td>
<td>-0.021</td>
<td>0.008</td>
<td>0.038</td>
<td>-0.030</td>
<td>0.002</td>
<td>0.048</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$y_{51}$</td>
<td>0.092</td>
<td>0.036</td>
<td>0.018</td>
<td>0.006</td>
<td>0.022</td>
<td>-0.036</td>
<td>-0.027</td>
<td>0.007</td>
<td>0.017</td>
<td></td>
</tr>
<tr>
<td>$y_{52}$</td>
<td>0.064</td>
<td>0.057</td>
<td>0.038</td>
<td>-0.012</td>
<td>0.030</td>
<td>0.008</td>
<td>-0.010</td>
<td>0.003</td>
<td>0.006</td>
<td>-0.017</td>
</tr>
<tr>
<td>$y_{61}$</td>
<td>0.374</td>
<td>0.563</td>
<td>0.123</td>
<td>0.084</td>
<td>0.157</td>
<td>-0.045</td>
<td>-0.034</td>
<td>-0.096</td>
<td>0.080</td>
<td>0.065</td>
</tr>
<tr>
<td>$y_{62}$</td>
<td>-0.064</td>
<td>0.200</td>
<td>-0.061</td>
<td>-0.013</td>
<td>0.109</td>
<td>-0.094</td>
<td>0.065</td>
<td>-0.094</td>
<td>-0.001</td>
<td>0.129</td>
</tr>
<tr>
<td>$y_{71}$</td>
<td>0.535</td>
<td>0.392</td>
<td>0.141</td>
<td>0.132</td>
<td>0.145</td>
<td>0.097</td>
<td>0.056</td>
<td>0.156</td>
<td>0.104</td>
<td>0.048</td>
</tr>
<tr>
<td>$y_{72}$</td>
<td>0.034</td>
<td>0.218</td>
<td>-0.010</td>
<td>0.026</td>
<td>0.084</td>
<td>0.011</td>
<td>0.117</td>
<td>0.128</td>
<td>0.127</td>
<td>0.049</td>
</tr>
<tr>
<td>$y_{81}$</td>
<td>0.129</td>
<td>-0.019</td>
<td>0.012</td>
<td>0.044</td>
<td>0.025</td>
<td>-0.019</td>
<td>0.060</td>
<td>0.048</td>
<td>0.039</td>
<td>0.009</td>
</tr>
<tr>
<td>$y_{82}$</td>
<td>0.043</td>
<td>0.068</td>
<td>-0.025</td>
<td>-0.007</td>
<td>0.014</td>
<td>-0.015</td>
<td>0.001</td>
<td>0.005</td>
<td>-0.026</td>
<td>-0.004</td>
</tr>
<tr>
<td>$x_{11}$</td>
<td>0.021</td>
<td>-0.047</td>
<td>-0.014</td>
<td>0.013</td>
<td>0.013</td>
<td>-0.048</td>
<td>0.021</td>
<td>0.010</td>
<td>0.007</td>
<td>0.026</td>
</tr>
<tr>
<td>$x_{12}$</td>
<td>0.046</td>
<td>0.029</td>
<td>-0.006</td>
<td>-0.000</td>
<td>0.003</td>
<td>-0.006</td>
<td>0.036</td>
<td>0.034</td>
<td>0.018</td>
<td>0.046</td>
</tr>
<tr>
<td>$x_{21}$</td>
<td>-0.070</td>
<td>-0.221</td>
<td>-0.014</td>
<td>-0.043</td>
<td>-0.026</td>
<td>-0.043</td>
<td>-0.030</td>
<td>-0.084</td>
<td>-0.067</td>
<td>-0.029</td>
</tr>
<tr>
<td>$x_{22}$</td>
<td>0.040</td>
<td>0.156</td>
<td>0.030</td>
<td>0.007</td>
<td>0.100</td>
<td>-0.039</td>
<td>-0.075</td>
<td>-0.103</td>
<td>-0.015</td>
<td>0.001</td>
</tr>
</tbody>
</table>

$^a$Indicator names ($x_{ij}$'s and $y_{ij}$'s) may be referenced in Table 6.
<table>
<thead>
<tr>
<th>$y_{61}$</th>
<th>$y_{62}$</th>
<th>$y_{71}$</th>
<th>$y_{72}$</th>
<th>$y_{81}$</th>
<th>$y_{82}$</th>
<th>$x_{21}$</th>
<th>$x_{22}$</th>
<th>$x_{31}$</th>
<th>$x_{32}$</th>
</tr>
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<tbody>
<tr>
<td>-0.006</td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>-0.004</td>
<td>0.006</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-0.007</td>
<td>-0.198</td>
<td>0.299</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.053</td>
<td>0.086</td>
<td>-0.000</td>
<td>-0.299</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-0.093</td>
<td>-0.037</td>
<td>0.146</td>
<td>0.098</td>
<td>0.050</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-0.128</td>
<td>-0.121</td>
<td>0.146</td>
<td>0.126</td>
<td>0.007</td>
<td>-0.036</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.051</td>
<td>-0.003</td>
<td>0.102</td>
<td>0.023</td>
<td>0.026</td>
<td>-0.018</td>
<td>0.010</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.030</td>
<td>0.017</td>
<td>0.122</td>
<td>0.082</td>
<td>0.032</td>
<td>-0.001</td>
<td>-0.000</td>
<td>-0.010</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.315</td>
<td>0.102</td>
<td>0.186</td>
<td>-0.108</td>
<td>-0.050</td>
<td>-0.087</td>
<td>-0.033</td>
<td>0.029</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.341</td>
<td>0.101</td>
<td>0.135</td>
<td>-0.082</td>
<td>-0.028</td>
<td>-0.067</td>
<td>-0.018</td>
<td>0.029</td>
<td>0.017</td>
<td>0.000</td>
</tr>
</tbody>
</table>
between structural differentiation and tension; fifth between socialization and tension; and sixth between communication and tension.

Furthermore, certain sources of measurement invalidity were considered as an explanation for the fit of the model. Due to unequal variances, certain subcomposites are not equally weighted in forming the corresponding composites. This is the case with the variables of tension and pervasiveness. By fixing one of the metrics of each concept \( \lambda_{1i} \) to be equal to one and freeing up the other \( \lambda_{12} \), where \( i = 3,7 \), it is expected that an optimum of weighting will be obtained.

**Model III**

The respecification of Model II suggested by LISREL IV was further examined by using only the LISREL procedure with role performance as an indicator of organizational effectiveness. Role performance was chosen, in order to ensure comparability of the LISREL solution, across the three alternative models examined in the present study. The reason for employing only the LISREL procedure at this point of model development stems from the already evident advantage of this approach to evaluate the fit of a model to the data and further to suggest ways for obtaining a more desirable fit. The new model (Model III) is presented in Figure 9 after the suggested respecifications of Model II were taken into account. Table 10 summarizes the major structural and measurement aspects of Model III.
Figure 9. Model III of cooperative organization.
cooperative organizational effectiveness (LISREL specification).
Table 10. Summary of the structural and measurement aspects of the revised model of cooperative organizational effectiveness in phase three (Model III)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Structural component abbreviations</th>
<th>Measurement component&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>OV</td>
</tr>
<tr>
<td>A. Independent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Selectivity</td>
<td>SELT [$\xi_1$]&lt;sup&gt;b&lt;/sup&gt;</td>
<td>$x_{11}$</td>
</tr>
<tr>
<td>2. Size</td>
<td>SIZE [$\xi_2$]</td>
<td>$x_{21}$</td>
</tr>
<tr>
<td>B. Dependent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Structural differentiation</td>
<td>STRD [$\eta_1$]</td>
<td>$y_{11}$</td>
</tr>
<tr>
<td>2. Scope</td>
<td>SCOP [$\eta_2$]</td>
<td>$y_{21}$</td>
</tr>
<tr>
<td>3. Pervasiveness</td>
<td>PERV [$\eta_3$]</td>
<td>$y_{31}$</td>
</tr>
<tr>
<td>4. Socialization</td>
<td>SOCL [$\eta_4$]</td>
<td>$y_{41}$</td>
</tr>
<tr>
<td>5. Communication</td>
<td>COMM [$\eta_5$]</td>
<td>$y_{51}$</td>
</tr>
<tr>
<td>6. Salience</td>
<td>SALT [$\eta_6$]</td>
<td>$y_{61}$</td>
</tr>
<tr>
<td>7. Tension</td>
<td>TENS [$\eta_7$]</td>
<td>$y_{71}$</td>
</tr>
<tr>
<td>8. Role performance</td>
<td>PFRT [$\eta_8$]</td>
<td>$y_{81}$</td>
</tr>
</tbody>
</table>

<sup>a</sup>OV : Observed Variables
ME : Measurement Error
SE : Specification Error.

<sup>b</sup>Subscripted symbols in square brackets correspond to the unobserved variables in Figure 9.
It follows the LISREL specification of the structural model.

\[
\begin{bmatrix}
1.0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
0 & 1.0 & 0 & 0 & 0 & 0 & 0 & 0 \\
B_{31} & 0 & 1.0 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & B_{43} & 1.0 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & B_{54} & 1.0 & 0 & 0 & 0 \\
B_{61} & 0 & 0 & 0 & 0 & 1.0 & 0 & 0 \\
B_{71} & 0 & 0 & B_{74} & B_{75} & B_{76} & 1.0 & 0 \\
0 & 0 & B_{83} & 0 & B_{85} & 0 & 0 & 1.0 \\
\end{bmatrix}
\begin{bmatrix}
\eta_1 \\
\eta_2 \\
\eta_3 \\
\eta_4 \\
\eta_5 \\
\eta_6 \\
\eta_7 \\
\eta_8 \\
\end{bmatrix}
= \begin{bmatrix}
\gamma_{12} \\
\gamma_{21} & \gamma_{22} \\
\gamma_{31} & \gamma_{32} \\
0 \\
0 \\
\gamma_{61} & \gamma_{62} \\
0 \\
\gamma_{81} \\
\end{bmatrix}
\begin{bmatrix}
\xi_1 \\
\xi_2 \\
\xi_3 \\
\xi_4 \\
\xi_5 \\
\xi_6 \\
\xi_7 \\
\xi_8 \\
\end{bmatrix}
+ \begin{bmatrix}
\zeta_1 \\
\zeta_2 \\
\zeta_3 \\
\zeta_4 \\
\zeta_5 \\
\zeta_6 \\
\zeta_7 \\
\zeta_8 \\
\end{bmatrix}
\tag{4.15}
\]

The equations relating the \( n \)'s to the \( y \)'s are as follow

\[
\begin{bmatrix}
y_{11} & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
y_{12} & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
y_{21} & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\
y_{22} & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\
y_{31} & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\
y_{32} & 0 & 0 & \lambda_{32} & 0 & 0 & 0 & 0 & 0 \\
y_{41} & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\
y_{42} & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\
y_{51} & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\
y_{52} & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\
y_{61} & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\
y_{62} & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\
y_{71} & 0 & 0 & 0 & 0 & 0 & 0 & \lambda_{71} & 0 \\
y_{72} & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\
y_{81} & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\
y_{82} & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\
\end{bmatrix}
\begin{bmatrix}
\eta_1 \\
\eta_2 \\
\eta_3 \\
\eta_4 + \eta_{41} \\
\eta_5 \\
\eta_6 \\
\eta_7 \\
\eta_8 \\
\end{bmatrix}
= \begin{bmatrix}
e_{11} \\
e_{12} \\
e_{21} \\
e_{22} \\
e_{31} \\
e_{32} \\
e_{41} \\
e_{42} \\
e_{51} \\
e_{52} \\
e_{61} \\
e_{62} \\
e_{71} \\
e_{72} \\
e_{81} \\
e_{82} \\
\end{bmatrix}
\tag{4.16}
\]

\( \text{y} \) 

\( \Lambda_y \) 

\( \eta \) 

\( \varepsilon \)
and the equations relating the $\xi$'s to the $x$'s are

$$
\begin{bmatrix}
    \xi_1 \\
    \xi_2
\end{bmatrix} =
\begin{bmatrix}
    1 & 0 \\
    0 & 1
\end{bmatrix}
\begin{bmatrix}
    x_1 \\
    x_2
\end{bmatrix} +
\begin{bmatrix}
    \delta_1 \\
    \delta_2
\end{bmatrix}
$$

The results for the final model, after the introduction of some new arrows and freeing up the loadings of pervasiveness and tension, are presented in Table 11. The $x^2$ for this model indicates a considerable improvement in fit over Model II ($x^2 = 226.69$, df = 167, $p = .0015$).

It appears that this model offers a more acceptable fit to the observed correlations. Comparing the change in $x^2$-values with the change in degrees of freedom between Model II and Model III it is evident that the improvement in fit gained is not a capitalization on chance.

The paths among the latent variables in Figure 9 have maximum likelihood estimates, which are significant at the .01 alpha level (two-tailed test), if they lead to the throughput variables of structural differentiation, scope, pervasiveness, socialization and communication or the output variable of role performance. The only exception is the coefficient of selectivity and pervasiveness, significant but only for the .05 alpha level in explaining scope and role performance respectively. Also, a nonsignificant negative path appears from size to pervasiveness; however, the estimated coefficient for size is quite
Table 11. Estimated coefficients of Model III with the LISREL procedure and role performance as an indicator of cooperative organizational effectiveness

<table>
<thead>
<tr>
<th>Equations</th>
<th>LISREL estimates^a</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
</tr>
<tr>
<td>STRD^b</td>
<td>SIZE</td>
</tr>
<tr>
<td>SCOPE</td>
<td>SELT</td>
</tr>
<tr>
<td></td>
<td>SIZE</td>
</tr>
<tr>
<td>PERV</td>
<td>SELT</td>
</tr>
<tr>
<td></td>
<td>SIZE</td>
</tr>
<tr>
<td></td>
<td>STRD</td>
</tr>
<tr>
<td>SOCL</td>
<td>PERV</td>
</tr>
<tr>
<td>COMM</td>
<td>SOCL</td>
</tr>
<tr>
<td>SALT</td>
<td>SELT</td>
</tr>
<tr>
<td></td>
<td>SIZE</td>
</tr>
<tr>
<td></td>
<td>STRD</td>
</tr>
<tr>
<td>TENS</td>
<td>STRD</td>
</tr>
<tr>
<td></td>
<td>SOCL</td>
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<tr>
<td></td>
<td>COMM</td>
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<td>SALT</td>
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<td>SELT</td>
</tr>
<tr>
<td></td>
<td>PENV</td>
</tr>
<tr>
<td></td>
<td>COMM</td>
</tr>
</tbody>
</table>

^a B: Estimated Coefficients, SE: Standard Error.

^b Abbreviated variables are explained in Table 10.

* T-value significant at .05 level (two-tailed test).

** T-value significant at .01 level (two-tailed test).
higher than its standard error.

It is further noted that almost all the paths leading either to salience or tension are nonsignificant. Only salience has a significant negative effect on tension. Most of these nonsignificant effects are less than their standard errors.

Selectivity as an input variable and communication as a throughput variable are the stronger predictors of role performance, followed by pervasiveness. In addition, socialization and structural differentiation have an indirect effect on role performance through communication and pervasiveness accordingly.

Selectivity, as a two-indicator latent variable proved to be an integral part of the model with three significant paths: scope, pervasiveness and role performance. Selectivity also indirectly affects socialization through pervasiveness.

Table 12 shows that the variances of the throughput and output specification errors are diverse, ranging from .038 to 2.26. Only pervasiveness and role performances have nonsignificant specification error variances, thus implying that the model was able to account for most of their variability, rather than for the remaining endogenous variables in the model. Role performance exhibits the least specification error in the model.

Table 13 summarizes the $x^2$ goodness-of-fit test across the three models, when role performance is used as an indicator of organizational effectiveness. The descriptive fit ratio for Model III is 1.36. Although the level of probability is relatively low ($p = .0015$),
Table 12. Maximum likelihood estimates (LISREL IV) for Model III of of cooperative organizational effectiveness

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Specification error variances&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Structural differentiation</td>
<td>.435** (.150)</td>
</tr>
<tr>
<td>2. Scope</td>
<td>.084** (.019)</td>
</tr>
<tr>
<td>3. Pervasiveness</td>
<td>.062 (.045)</td>
</tr>
<tr>
<td>4. Socialization</td>
<td>.209** (.040)</td>
</tr>
<tr>
<td>5. Communication</td>
<td>.053** (.017)</td>
</tr>
<tr>
<td>6. Salience</td>
<td>2.266** (.347)</td>
</tr>
<tr>
<td>7. Tension</td>
<td>1.575* (.758)</td>
</tr>
<tr>
<td>8. Role performance</td>
<td>.038 (.021)</td>
</tr>
</tbody>
</table>

<sup>a</sup> Standard errors in parentheses.

*T-value significant at .05 alpha level (two-tailed test).

**T-value significant at .01 alpha level (two-tailed test).

It has been noted (Kohn and Schooler, 1978) that a ratio of approximately 1.20 is a very good fit of a model to the data especially if a complex model is dealt with as in the present case and with a fit ratio close to the above.

It is apparent in Table 13 that in progressing from Model I to Model III there is a shift from a less desirable fit to a more desirable without at the same time capitalizing on chance. However, according to Joreskog (1969, p. 201), the question of when to stop fitting "cannot be decided on a purely statistical basis." Joreskog points out that it is
Table 13. $x^2$ goodness-of-fit tests for structural equation models of cooperative organizational effectiveness. Dependent variable: role performance$^a$

<table>
<thead>
<tr>
<th>Model</th>
<th>$x^2$</th>
<th>df</th>
<th>Probability</th>
<th>Change in degree of freedom</th>
<th>Change in $x^2$ value</th>
<th>Descriptive fit ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Model I</td>
<td>505.22</td>
<td>285</td>
<td>.0000</td>
<td></td>
<td></td>
<td>1.772</td>
</tr>
<tr>
<td>B. Model II</td>
<td>265.04</td>
<td>177</td>
<td>.0000</td>
<td>108</td>
<td>240.17</td>
<td>1.497</td>
</tr>
<tr>
<td>C. Model III</td>
<td>226.69</td>
<td>167</td>
<td>.0015</td>
<td>10</td>
<td>38.34</td>
<td>1.357</td>
</tr>
</tbody>
</table>

$^a$Maximum likelihood estimates were computed with the LISREL IV program described in Joreskog and Sorbom (1979).
quite important for the researcher to also consider theoretical and con­ceptual considerations. In his words, "ultimately the criteria for goodness of the model depends on the usefulness of it and the results it produces."

As the present study did not succeed in obtaining a good fit in the original theoretical model (Model I), the decision was made to examine alternative models. Of course, since this is model development, it will need to be tested in future research. When alternative models were examined, the one presented here (Model III), was found to provide a more desirable fit to the data. The decision to stop fitting additional parameters is based on the "usefulness" of the present model, as suggested by Joreskog. The three variables of selectivity, pervasiveness and communication which affect role performance seem also at the same time to be amenable to manipulation by the organization. Hence they are useful for organizational designers and policy makers within the organization. Furthermore, communication is affected by socialization. The past variable can also be amenable to control by the organization and therefore indirectly to affect organizational effectiveness. In short, Model III has a quite satisfactory descriptive fit ratio (1.35). The model is useful, in the sense that suggests variables amenable to manipulation to affect significantly role performance. Since Joreskog points out that the decision to stop fitting is not just a pure statistical matter, the present study will stop at this phase of model development. Future research may bring into consideration additional assumptions such as correlated errors and continue further testing of
this model development so that a more satisfactory statistical fit is obtained.
Chapter 5.
Summary and Conclusions

Summary of implementation

The major emphasis of this study was twofold: first, the reformulation of a model of cooperative organizational effectiveness by integrating Etzioni's compliance scheme within an open-system framework; second, the consideration of measurement errors in parameter estimation and the comparison of the alternative procedures of Ordinary Least-Squares (OLS), Fuller's Errors-in-Variables technique (EIV) and Joreskog's factor analytic approach in analyzing linear structural relationships by the method of maximum likelihood (LISREL).

For the theoretical framework, Etzioni's compliance scheme and the open system perspective were reviewed. Based on this theoretical framework through deductive reasoning, the initial theoretical model of cooperative organizational effectiveness (Model I) was developed (Figure 1). Model I includes system components of environment, input, size, throughput and output. Etzioni's compliance variables were discussed, and the issue of causal inferences of environment, inputs and organizational size to organizational throughput variables was presented. Model I postulated the sets of environmental, input and size variables as exogenous to the model. These exogenous variables affect the intervening endogenous throughput variables and, in turn, affect each of the organizational effectiveness measures. The specific theoretical propositions of Model I (Figure 2) were discussed using relevant literature from
Etzioni's social system and formal organizational theory. Relevant literature on farmer cooperatives was used when appropriate. Etzioni's emphasis on a mobilized effectiveness model was considered, with the major concern of this model on goal attainment rather than on any other organizational subsystem. Based on this discussion and taking into account the unit of analysis (farmer cooperatives), Net Operating Revenue, Net Savings and Role Performance were selected as the measures of organizational effectiveness.

Measurement of the concepts of the theoretical model was based on a portion of data from the Managerial Success Study of 1971. A standardization procedure was followed for most of the concepts in the model and finally, two indicators were used to measure each respective concept.

Structural equation models, the causal approach to measurement error and relevant reliability estimates were discussed, as well as the basic assumptions of OLS, EIV and LISREL procedures, respective coefficient estimates and their interpretation. Measurement error variances for each concept were computed utilizing the reliability estimates. The results of an F-test, assessing the quality of the proposed indicators showed that no observed value of each composite was made up solely of measurement error.

Following the LISREL specification of the initial theoretical model of cooperative organizational effectiveness, Figure 7 combines the structural and measurement components of the model developed accordingly in Chapters two and three.
Model I in Figure 7 was analyzed using OLS, EIV and LISREL procedures when role performance was used as an indicator of organizational effectiveness. The findings showed that the significant EIV and LISREL coefficients are consistently larger than the OLS coefficients. Also, all the estimated standard errors for the EIV and LISREL estimates are consistently larger than the OLS estimated standard errors. Both approaches, LISREL and EIV have almost identical results in terms of the significant coefficients found. Most of the significant coefficients estimated by the LISREL procedure are, on the average, slightly higher in size than the corresponding coefficients estimated with the EIV procedure. These slight differences may be attributed to the fact that the EIV approach deals separately with each dependent variable in estimating coefficients; the LISREL model handles all the parameters to be estimated simultaneously in a system of equations in which efficient estimates of the parameters are obtained through the method of maximum likelihood. LISREL $R^2$ estimates appear generally higher than do the EIV $R^2$ estimates, except for the equation in which tension is the dependent variable. Finally, both LISREL and EIV approaches have higher $R^2$ estimates than the OLS approach does. Assuming that sampling errors were negligible, this is due to the fact that in the former two approaches measurement error was taken into account and the unexplained variation of the true dependent variables is mainly composed of errors in the equation. In the case of OLS, the unexplained variation in the observed dependent variables is influenced by the errors in the equation plus the errors of measurement of the dependent and independent variables, assuming that
there is no sampling error. After examination of the fit of Model I to the data by using LISREL $\chi^2$-criterion of the goodness of fit, respecification of the model was suggested by deleting the nonsignificant paths found in Model I.

A final point to be noted is that the above comparisons across the OLS, EIV and LISREL procedures and subsequent conclusions are valid under the LISREL and EIV specifications that measurement errors and specification errors are uncorrelated within itself and between each other. At this phase of analysis, as well as in the subsequent phases in which model development was carried out, no assumptions about correlated measurement errors or disturbance terms were made. It might be that under different assumptions quite different conclusions could be drawn in comparing the three approaches. This is due to the fact that by changing assumptions, parameter estimates are also changing, in the case of LISREL and EIV procedures.

In the next phase, a second model of cooperative organizational effectiveness was developed. Figure 8 illustrates the LISREL specification of Model II with the structural and measurement components. Nearly all the estimated parameters are significant in Model II analysis techniques (Table 7). With a few exceptions, coefficients estimated with the EIV and LISREL approaches tend to be higher than with the OLS approach. Due to the full information techniques employed with the LISREL procedure, coefficient estimates change somewhat whenever a different indicator of cooperative organizational effectiveness is used. Coefficients estimated by the EIV and LISREL procedures do not seem to
present any explicit distinguishable pattern in terms of their size. Standard errors under the EIV procedure are higher than under the OLS procedure. In the case of LISREL, only in two paths are corresponding standard error estimates less than the corresponding OLS estimates. This is the case with market potential leading to net savings and salience to net operating revenue. Estimates of $R^2$ by the EIV and LISREL procedures are again higher than the OLS estimates are. Due to the more efficient use of information available by the LISREL procedure, the respective $R^2$ estimates are higher than are EIV $R^2$ estimates. Although, according to the LISREL $x^2$-criterion of model fit to the data, Model II exhibits a more desirable fit than Model I does, it was decided to respecify Model II based on the matrix of residuals (Table 9) provided by LISREL and taking further into account sources of measurement invalidity. New arrows were fitted from structural differentiation to pervasiveness, salience and tension; from size to salience and from socialization and communication to tension. Furthermore, in the case of tension and pervasiveness one of the metrics ($\lambda_{ij}$) was fixed equal to one while the other was left free.

Figure 9 presents Model III, developed during the third phase of this model development. Model III was analyzed by using only the LISREL procedure with organizational effectiveness measured by role performance. It appears to offer a more acceptable fit to the data than does either of the previous two models. Comparing the change in $x^2$-values with the change in degrees of freedom between Model II and Model II (Table 13), it is evident that the improvement in fit gained is not a capitalization
on chance. However, the model is less satisfactory in terms of the level of statistical significance reached, which is less than .05. Selectivity as an input variable and communication as a throughput variable were the stronger predictors of role performance in the last model, followed by pervasiveness. These variables are taken as manipulatable. Role performance can also be increased indirectly by socialization through communication. The last indirect effect is also manipulatable. The decision to stop fitting errors was based mainly on the "utility" of the model rather than on the basis of statistical criteria.

Implications to organizational theory

This study represents a theoretical and empirical effort to integrate Etzioni's compliance theory into an open-system framework. The following two general implications can be drawn for organizational theory.

The first implication is that open-system theory can be effectively integrated with Etzioni's compliance theory. Input variables such as selectivity and contextual variables such as size display some of the strongest relationships to Etzioni's compliance throughput variables, based on the final model (Model III) developed in this study. Selectivity also bears a strong relationship either directly or indirectly through the throughput variable of pervasiveness to organizational effectiveness as measured by role performance. Open-system theory seems to provide the necessary conceptual tools for potentially enhancing the understanding of complex organizations by delineating specific conceptual areas in which the concepts of less general theories of organizational behavior can be classified and interrelated in a meaningful way.
The second major implication evident from testing the initial theoretical model of cooperative organizational effectiveness and subsequent model development is the combination of causal modeling that is built into the LISREL procedure. This feature allows for the specification of a causal structure among a set of unobservable variables as well as measurement specifications relating the measured variables to these unobserved variables. In this way, the interaction between theory and measurement is treated as a systemic entity and results in a number of analytical advantages. First, optimally efficient estimation of the parameters is achieved via maximum likelihood methods. The program allows a simultaneous estimation of all model parameters, including correlated disturbances and the measurement structure. Also, certain parameters can be fixed or constrained equal in such models, and the consequences of the goodness of fit can be monitored. Second, the true relationships between the unobserved variables can be estimated after taking into account random error in the measures. The logic of measurement model calls for the use of multiple indicators of important concepts in such cases as possible. It is the multiplicity of indicators that enables the differentiation of unreliability of measurement from change in true scores. Third, a $\chi^2$ goodness-of-fit statistic can be used to assess specification issues and tests are available for individual coefficients.

Implications for research methods

The major implications of this study for research methods are connected with the use of measurement error adjustment techniques,
especially juxtaposition and comparison of two advanced statistical models, EIV and LISREL, with the OLS technique.

Relationships reported in this study and based on the EIV or LISREL procedures reflect the degree of relationship between the true values of one variable and the true values of another variable or set of other variables. According to Goldberger (1973, p. 2), in a structural equation model, each equation represents a causal link rather than a mere empirical association. On the other hand, in a regression model each equation represents the conditional mean of a dependent variable as a function of explanatory variables. True relationships were examined in the present study by both procedures, EIV and LISREL, in testing the initial theoretical model and later in model development which, through successive models (Model II and III) obtained a more desirable fit of the cooperative effectiveness model to the data. Of course, this model development must be further examined in future research so that the criterion of obtaining a statistically significant fit of the model to the data may also be met. Goldberger (1973, p. 6) maintains that the search for structural parameters is a search for invariant features of the mechanisms that generate observable variables. Invariant features are those which do not change or vary individually over the set of populations in which we are interested. Goldberger contends that in a case in which regression parameters are invariant, they are proper objects of research and that regression is an appropriate tool. However, as appears to be the case with many areas of sociological inquiry, regression parameters lack this invariance due to problems of measurement.
error. In this respect, the proper objects of research are more funda- 
mental parameters and statistical tools such as the EIV or LISREL pro-
procedure, which go beyond conventional regression.

Regarding estimates obtained by the LISREL and EIV procedures, 
slight differences appear to exist, since the EIV procedure examines each 
structural equation separately while the LISREL procedure examines all 
structural equations simultaneously as a system. Also, there are some 
computational procedure differences such as EIV has a correction for 
bias built into the procedure. In the present study, uncorrelated errors 
were assumed throughout. It appears that in specifying the model under 
these assumptions, the cost of running the LISREL IV program increases 
more rapidly than does the corresponding SUPER CARP program, especially 
as the number of the variables in the model increases due to the full-
information iterative procedures employed in the former program. SUPER 
CARP stops analysis if the matrix is singular. However, many of the 
estimates obtained by LISREL are not obtained by the EIV procedure and 
in the latter case may have to be determined prior to or after completion 
of the analysis. This is the case with the weighting of indicators and 
measurement errors, standard errors and t-tests for coefficients other 
than the regression coefficients, standardized regression coefficients 
along with remaining standardized estimates and specification error 
variance. LISREL IV tests the significance of the variance of specifica-
tion error in the initial analysis, while SUPER CARP tests the signifi-
cance of specification error, although requiring separate analysis be 
specified. In addition, calculating $R^2$ estimates with the LISREL
solution is a less cumbersome experience than with the EIV solution (see Table E.1, Appendix E). Another major advantage of LISREL as compared to the EIV procedure is that it provides an overall goodness of fit test ($\chi^2$-test) for the whole model and that it further suggests ways to respecify the model in case the fit is not satisfactory. However, using the LISREL program, each model is estimated by the maximum likelihood method, based on the assumption that the observed variables have a multivariate normal distribution. Joreskog and Sorbom (1977, p. 324) point out that further research is needed to assess how serious departures from multivariate normality are (a) for estimation and (b) for testing goodness-of-fit. On the other hand, the multinormality assumption is not required for the EIV procedure. It appears that at the present stage of research regarding the LISREL program, whenever the assumption of normality is violated by the data available, EIV is a very good alternative with probably more robust estimates. Bielby and Hauser (1977, p. 153) also point out that at the present little is known about the robustness of the statistical properties of the LISREL estimators with respect to violation of the multivariate normality assumption. In addition, SUPER CARP allows for a multiplicity of F tests on B coefficients examined together as well as incorporating a correction for bias due to sample size. Finally, it allows for examination of nonrandom samples as in the case of cluster sampling.

Suggestions for farmer cooperatives

The analysis of this dissertation, based on the level of fitness reached through successive model development, is rather cautious in
making concrete suggestions for policy makers and organizational designers. Although gradual model development led to Model III, with the most acceptable fit to the data, the statistical significance reached \( p = .0015 \) for the \( x^2 \)-criterion of goodness of fit, indicates caution in drawing overall generalizations about organizational variables and their potential effect of change on organizational effectiveness. However individual equations within the model may be very meaningful.

Porter et al. (1975, p. 439) identify three ways for implementing organizational change: (1) changing the individual who work in the organization, (2) changing specific organizational structures and systems and (3) changing directly the overall climate and interpersonal style which characterize an organization. Based on Model III in which role performance is used to indicate organizational effectiveness, this study suggests implementation of organizational change via the first two procedures and potentially with the third as well.

Selectivity and socialization have a direct and indirect effect on organizational effectiveness respectively. Both processes implement change first at the individual level. Through selectivity, characteristics of people in farmer cooperatives make important differences in effectiveness as measured by role performance. The present study also indicates that socialization and training activities mold and change individuals to better fit the needs of farmer cooperatives by affecting communication processes and thus indirectly affecting role performance.

On the other hand, pervasiveness and communication, shown by this study to relate directly to role performance of coop managers, represent
modes of change implemented beyond the individual level. Furthermore, all these variables are manipulatable. However, only further research especially on a longitudinal bases can provide more definitive answers in terms of their potential use in affecting effectiveness of agricultural cooperatives as measured by role performance or any other operational expression of organizational effectiveness.

Suggestions for future research

In conclusion, it is felt that further research is needed to empirically substantiate and expand the systemic model of cooperative organizational effectiveness analyzed in the present study. The model development pursued in the second and third phases of this study must further be adapted and tested for the same or other organizational types (coercive, normative) or even other places besides domestic ones (e.g. third world studies). Certain concepts and measures such as elite consensus or competition that proved statistically nonsignificant in the present study, need further testing with the same or alternative measures in future research. The fact, that these measures proved nonsignificant may be just an implication of the way they were operationalized. In addition, in subsequent research further comparison of the EIV and LISREL procedures must be pursued to consider correlated errors and/or reciprocal causation.

Another point to be considered in more study is the employment of simultaneous equation models with dynamic and not only static relationships. Kimberly (1976, p. 322) has pointed out that most of our data
about organizations are crossectional while our theories are of necessity dynamic. Furthermore, the need for causal inferences based on correlational analysis of "rates" of change and not just mere analysis of "level" has also been emphasized, either more generally or more specifically in the context of organizational effectiveness (Etzioni, 1975, p. 324; Warren et al., 1976, p. 352; Dewar and Hage, 1978, p. 112).

Finally, based on certain of the points made by Joreskog and Sorbom (1977, p. 324) regarding LISREL it appears that also including the EIV technique in future research must determine how it can be extended to handle qualitative variables and nonlinear relationships in the variables and disturbances, or furthermore, in the case of LISREL between variables and their indicators.
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Woodward, Joan

Wright, Sewall

Yetley, Mervin John

Yilmaz, Esmer

Yuchtman, Ephraim and Stanley E. Seashore
ACKNOWLEDGEMENTS

Various individuals have supported me during my graduate education and I would like to acknowledge their contribution to my professional development. I am grateful to my parents for providing encouragement and subjecting themselves to sacrifices, especially for pursuing higher education in Greece. In addition, I would like to express my deep appreciation and indebtedness for the sacrifices of my wife, Kiki. Her understanding, love and moral support were valuable throughout the years of my graduate work. Appreciation is also accorded to my little daughter, Renia, who many times was asking her daddy "why do you leave me alone and go to school?"

The faculty of Iowa State provided me with professional instruction and atmosphere conducive to scholarly work. The author wishes to express sincere appreciation to Dr. Richard Warren, director of his dissertation for combining consistent good scientific advice with humanistic understanding. He would also like to thank Dr. Warren for permission to use the data set of the Managerial Success Study of 1971 for this analysis. A great deal of appreciation is due the other members of the Program of Study Committee as well. Drs. Roy D. Hickman, Gerald E. Klonglan, Charles L. Mulford and John L. Tait all aided in the program.

Finally I would like to acknowledge the monetary support rendered to me by the Institute of International Education, the Department of Sociology and Anthropology, Iowa State University, and the Greek Government during my graduate education.
APPENDIX A.

ITEMS OR QUESTIONS USED IN THE MEASUREMENT OF VARIABLES
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<th>Item/quest.</th>
<th>Analasched-</th>
<th>Item or question and code</th>
</tr>
</thead>
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<td>file schedule #</td>
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<td>1. Market potential</td>
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<td>MKTA1</td>
<td>.346</td>
<td>Number of hogs sold</td>
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<td>MKTA2</td>
<td>347</td>
<td>Number of cattle sold (all by county of residence of the cooperative)</td>
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<td>MKTBl</td>
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<td>Value of commercially mixed feed</td>
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<tr>
<td>COMPA1</td>
<td>QUE002</td>
<td>Other competitive businesses</td>
</tr>
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<td></td>
<td></td>
<td>How many other businesses with similar major product lines are operating in your trade area?</td>
</tr>
<tr>
<td>COMPB1</td>
<td>QUE003</td>
<td>Number of major competitors</td>
</tr>
<tr>
<td></td>
<td></td>
<td>How many of these are major competitors in your opinion?</td>
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<tr>
<td>3. Elite consensus</td>
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3. Elite consensus (continued)

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4. Structural differentiation

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<th>Anal. file var. #</th>
<th>Schedule #</th>
<th>Item or question and code</th>
</tr>
</thead>
<tbody>
<tr>
<td>STRDA1</td>
<td>VAR026</td>
<td></td>
<td>Number of specific areas</td>
</tr>
<tr>
<td>STRDA2</td>
<td>VAR028</td>
<td></td>
<td>Number of heads</td>
</tr>
<tr>
<td>STRDB1</td>
<td>VAR048</td>
<td></td>
<td>Number of distinct positions listed on the organization charts (constructed item)</td>
</tr>
<tr>
<td>STRDB2</td>
<td>VAR049</td>
<td></td>
<td>Number of levels</td>
</tr>
</tbody>
</table>

5. Socialization

<table>
<thead>
<tr>
<th>Item/quest.</th>
<th>Anal. file var. #</th>
<th>Schedule #</th>
<th>Item or question and code</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOCA1</td>
<td>404 46</td>
<td></td>
<td>What methods are used to train and develop your employees? Explain each of these.</td>
</tr>
<tr>
<td>SOCA2</td>
<td>267 129a</td>
<td></td>
<td>Total number of coop managers.</td>
</tr>
<tr>
<td>SOCA3</td>
<td>517 129b</td>
<td></td>
<td>Where do your directors obtain information they use in discharging their duties?</td>
</tr>
<tr>
<td>Item/Quest. #</td>
<td>Analas Schedule file var. #</td>
<td>Item or question and code</td>
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<td></td>
</tr>
<tr>
<td>5. Socialization (continued)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SOCBl</td>
<td>405</td>
<td>Total number of management meetings attended.</td>
<td></td>
</tr>
<tr>
<td>SOCB2</td>
<td>271</td>
<td>Where do you regularly obtain information to help in the management of this cooperative?</td>
<td></td>
</tr>
<tr>
<td>SOCB3</td>
<td>518</td>
<td>Where do your employees obtain information in the nature and philosophy of cooperative?</td>
<td></td>
</tr>
<tr>
<td>6. Communication</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COMAl</td>
<td>033 B33</td>
<td>Under the right conditions workers will seek and accept responsibility.</td>
<td></td>
</tr>
<tr>
<td>COMA2</td>
<td>065 B65</td>
<td>If a man wants a thing done right, he must do it himself.</td>
<td></td>
</tr>
<tr>
<td>COMA3</td>
<td>106 33</td>
<td>Employee production can be increased by consulting employees on decisions that affect them.</td>
<td></td>
</tr>
<tr>
<td>COMA4</td>
<td>113 40</td>
<td>Employee production can be increased by informing workers when a change is coming up that will affect their jobs.</td>
<td></td>
</tr>
<tr>
<td>COMA5</td>
<td>115 42</td>
<td>Employee production can be increased by telling employees that they're doing good work whether they are or not.</td>
<td></td>
</tr>
<tr>
<td>COMA6</td>
<td>229 48</td>
<td>Most businesses attempt to create a favorable image with their customers. What are the essential features or ingredients in the image you are trying to create for this business?</td>
<td></td>
</tr>
</tbody>
</table>
### Item/ Analas Schedule Item or question and code
question. file ule # 

#### 6. Communication (continued)

<table>
<thead>
<tr>
<th>Item/ Analas Schedule Item or question and code</th>
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<tbody>
<tr>
<td>quest. file ule #</td>
</tr>
<tr>
<td>COMA7 471 129e Total number of product meeting manager.</td>
</tr>
<tr>
<td>COMB1 047 B47 You can really get farther by talking with and cooperating with people.</td>
</tr>
<tr>
<td>COMB2 105 32 Employee production can be increased by periodically informing employees of their progress on jobs.</td>
</tr>
<tr>
<td>COMB3 111 38 Employee production can be increased by being interested in the personal well-being of your employee.</td>
</tr>
<tr>
<td>COMB4 114 41 Employee production can be increased by telling employees why their work is important.</td>
</tr>
<tr>
<td>COMB5 103 28 Which one of these statements best describes the way you feel about key employee relationships with patron-members?</td>
</tr>
<tr>
<td>a. They have a responsibility to keep themselves well informed and make recommendations on all our major product lines = 4</td>
</tr>
<tr>
<td>b. They have a responsibility to pass on only that information about our major product lines which is requested by customer = 3</td>
</tr>
<tr>
<td>c. They should be extremely cautious in making recommendations about our major product line since a poor recommendation results in a loss of customers = 2</td>
</tr>
<tr>
<td>d. They should provide the products requested by customers, but should make no recommendations about their uses = 1</td>
</tr>
<tr>
<td>COMB6 233 29 As you think of merchandising your products, do you classify your farmer customers into different groups and use different selling approaches on them? No = 1, Yes = 2</td>
</tr>
<tr>
<td>Item/Anal</td>
</tr>
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<td>----------</td>
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<tr>
<td>#</td>
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</tbody>
</table>

### 6. Communication (continued)

<table>
<thead>
<tr>
<th>Item/Anal</th>
<th>Sched-quest.</th>
<th>Item or question and code</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMB7</td>
<td>519</td>
<td>129e</td>
</tr>
</tbody>
</table>

You mentioned classifying. What are the major factors you take into consideration in classifying them?

Where do you and your employees obtain information on products?

### 7. Selectivity

<table>
<thead>
<tr>
<th>Item/Anal</th>
<th>Sched-quest.</th>
<th>Item or question and code</th>
</tr>
</thead>
<tbody>
<tr>
<td>SELA1</td>
<td>184</td>
<td>I.Q. Judgment Raw Score</td>
</tr>
</tbody>
</table>

Keeping in mind your high school experience, how would you rank yourself as a student?

- a. _____ in the best 5%
- b. _____ in the best 10%
- c. _____ in the best 25%
- d. _____ in the upper half
- e. _____ in the lower half

<table>
<thead>
<tr>
<th>Item/Anal</th>
<th>Sched-quest.</th>
<th>Item or question and code</th>
</tr>
</thead>
<tbody>
<tr>
<td>SELA2</td>
<td>241</td>
<td>81</td>
</tr>
</tbody>
</table>

Where would you belong in a list of 100 typical people in the kind of job you do best?

- a. _____ in the best 5%
- b. _____ in the upper third
- c. _____ in the middle third
- d. _____ in the lowest third
- e. _____ I don't know

<table>
<thead>
<tr>
<th>Item/Anal</th>
<th>Sched-quest.</th>
<th>Item or question and code</th>
</tr>
</thead>
<tbody>
<tr>
<td>SELA3</td>
<td>244</td>
<td>84</td>
</tr>
</tbody>
</table>

What methods do you use to determine the number and qualifications of the employees needed in your business firm?
| Item/ Analas | Sched- | Item or question and code |
| request. file | ule # | |
| # | var. # | |

### 7. Selectivity (continued)

**SELA5** 237 109  
Will you please give me an interpretation of the status of this business as represented on these financial sheets?

**SELA6** 239 111  
What do you feel the main purposes of financial statements?

**SELB1** 407 140  
How many years of formal education have you completed?  (ENCIRCLE APPROPRIATE NUMBER.)

<table>
<thead>
<tr>
<th>8 or less</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
<th>17</th>
<th>18</th>
<th>19</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elementary</td>
<td>High School</td>
<td>College</td>
<td>Beyond BA or BS</td>
<td></td>
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</tr>
</tbody>
</table>

**SELB2** 186  
I.Q. Parts Raw Score.

**SELB3** 249 89  
How do you feel about your self-confidence?

a. ____ I am quite confident of myself in any phase of activity.  
b. ____ I am quite confident of myself in most phases of activity.  
c. ____ I have quite a bit of self-confidence about my intellectual ability, but I am not as self-confident about my social abilities.  
d. ____ I have quite a bit of self-confidence about my social ability, but I am not as self-confident about my intellectual ability.  
e. ____ I lack some self-confidence in both intellectual and social activities.

**SELB4** 236 108  
When pricing products and services several factors must be taken into account. Under certain conditions it may be wise to maintain a wide margin even at the sacrifice of sales volume while in other instances it would be better to maintain a smaller margin to get increased sales volume.
<table>
<thead>
<tr>
<th>Item/quest. file var. #</th>
<th>Schedule #</th>
<th>Item or question and code</th>
</tr>
</thead>
<tbody>
<tr>
<td>SELB5 238 110</td>
<td>What additional information do you need to take full advantage of these statements? For each situation, please state whether you would maintain a large margin with the possibility of decreasing the volume, or maintain in a small margin with the possibility of increasing the volume (ENCIRCLE ONE). L S 1. Brand handled is recognized by customers as superior to that of competitors. L S 2. Extra services wanted by customers cannot be (or are not) provided by this coop. L S 3. Many other dealers in the trade area have full competitive lines. L S 4. An aggressive sales and merchandising program is maintained. L S 5. Many expenses are fixed so that total per unit handling costs decrease sharply as volume increases. L S 6. Increased sales of this line have little value for increasing sales of other lines handled.</td>
<td></td>
</tr>
<tr>
<td>SELB5 238 110</td>
<td>What additional information do you need to take full advantage of these statements?</td>
<td></td>
</tr>
<tr>
<td>SELB6 240 112</td>
<td>Persons conducting management training sessions often list certain functions of management. What do you consider to be the major functions of management?</td>
<td></td>
</tr>
<tr>
<td>Item/ Analysis</td>
<td>Schedule #</td>
<td>Item or question and code</td>
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<td>---------------</td>
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<tr>
<td>quest. file</td>
<td>var. #</td>
<td></td>
</tr>
</tbody>
</table>

### 8. Scope

**SCO1A** 245 85

Assuming you have free choice, to whom would you go for advice on an exceptionally difficult business problem?

- a. my board
- b. associates within my community
- c. my assistant manager or other key employees
- d. other managers of businesses of this type

**SCO2A** 119 60

What is the extent to which your employees can influence the goals, methods, and activities of their jobs? How much influence do they have?

- a. no influence
- b. little influence
- c. moderate influence
- d. a great deal of influence

**SCO3A** 304 63a

Who actually makes the decision on the firing of employees other than the manager?

**SCO4A** 307 66a

Who actually makes the decision on organizing and coordinating the day's work?

**SCO5A** 309 68a

Who actually makes the decision on determination of the amount and type of advertising commodities?

**SCO6A** 246 B6

Which of the following best describes your action when you have a tough business problem to solve?

- a. sit down and figure it out myself
- b. talk it over with my wife or friends
- c. talk it over with some of the key employees
- d. talk it over with my board of directors
- e. let it ride for awhile then tackle it fresh later on
<table>
<thead>
<tr>
<th>Item/quest. file #</th>
<th>Sched-ule #</th>
<th>Item or question and code</th>
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</thead>
<tbody>
<tr>
<td>SCOB2 303 62a</td>
<td></td>
<td>Who actually makes the decision on whether or not to add or drop a product line?</td>
</tr>
<tr>
<td>SCOB3 306 65a</td>
<td></td>
<td>Who actually makes the decision on hiring of a new employee for an existing position other than a manager?</td>
</tr>
<tr>
<td>SCOB4 308 67a</td>
<td></td>
<td>Who actually makes the decision on assignment of daily work tasks to employees?</td>
</tr>
<tr>
<td>SCOB5 310 69a</td>
<td></td>
<td>Who actually makes the decision on when to make repairs or order parts on worn but serviceable equipment?</td>
</tr>
<tr>
<td>SCOB6 520 129e</td>
<td></td>
<td>During the last 18 months, have you attended any of the following with one or more of your directors? a. Short courses (and clinics) b. Meetings (and clinics) c. (ISU) Extension Specialists - Personal Visit</td>
</tr>
</tbody>
</table>

9. Pervasiveness

<table>
<thead>
<tr>
<th>PERVA1 138 86</th>
<th></th>
<th>Do you have an organizational chart? Yes = 1 (GO TO Q.88) No = 0 (GO TO Q.87)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PERVA2 169 98</td>
<td></td>
<td>Please indicate whether there is a written policy regarding (total number listed) a) vacation time (annual leave) Yes ____ = 1 No ____ = 0 b) sick leave Yes ____ = 1 No ____ = 0 c) evaluation of job performance Yes ____ = 1 No ____ = 0 d) job contracts Yes ____ = 1 No ____ = 0</td>
</tr>
<tr>
<td>Item/Anal</td>
<td>Sched-</td>
<td>Item or question and code</td>
</tr>
<tr>
<td>quest.</td>
<td>file</td>
<td>#</td>
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<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>e) credit policy (for customers)</td>
<td>Yes ____ = 1</td>
<td>No ____ = 0</td>
</tr>
<tr>
<td>f) objectives (goals)</td>
<td>Yes ____ = 1</td>
<td>No ____ = 0</td>
</tr>
<tr>
<td>g) plans (short or long run)</td>
<td>Yes ____ = 1</td>
<td>No ____ = 0</td>
</tr>
<tr>
<td>h) dismissals</td>
<td>Yes ____ = 1</td>
<td>No ____ = 0</td>
</tr>
<tr>
<td>i) employee-patron relation</td>
<td>Yes ____ = 1</td>
<td>No ____ = 0</td>
</tr>
<tr>
<td>j) budget</td>
<td>Yes ____ = 1</td>
<td>No ____ = 0</td>
</tr>
<tr>
<td>k) sales plan</td>
<td>Yes ____ = 1</td>
<td>No ____ = 0</td>
</tr>
</tbody>
</table>

9. Pervasiveness (continued)

PERVA3 179 118 How many departments do you have ____ (No.)? What are they?
PERVB1 178 117 What are your major product lines?
PERVB2 191 128 "Very informal" to "Very formal."
PERVB3 193 144 To how many local community organizations do you belong?
PERVB4 228 45 How do you determine the responsibilities and workloads of each of your employees?

10. Salience

SALA1 121 52 Are you satisfied with your present position when you compare it to similar managerial positions in the state? Yes - S 1 2 3 4 5

SALA2 124 55 Are you satisfied with your present salary? Yes - S 1 2 3 4 5
<table>
<thead>
<tr>
<th>Item/quest.</th>
<th>Analag file</th>
<th>Schedule var. #</th>
<th>Item or question and code</th>
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<tbody>
<tr>
<td>10. Salience (continued)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SALA3 125 56</td>
<td>Are you satisfied with the amount of time you must devote to your job?</td>
<td>Yes - S 1 2 3 4 5</td>
<td>No - D</td>
</tr>
<tr>
<td>SALA4 126 57</td>
<td>Are you satisfied with the amount of interest shown by the community in its cooperative?</td>
<td>Yes - S 1 2 3 4 5</td>
<td>No - D</td>
</tr>
<tr>
<td>SALA5 129 60</td>
<td>Are you satisfied with the level of challenge and responsibility you are faced with in your present position?</td>
<td>Yes - S 1 2 3 4 5</td>
<td>No - D</td>
</tr>
<tr>
<td>SALA6 135 75</td>
<td>The board of this coop does not take the initiative in the areas where they have the responsibility.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SALA7 158 125</td>
<td>While on the job, to what extent do you feel the employees &quot;think of themselves first&quot; versus &quot;working/thinking of the good of the coop?&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SALB1 122 53</td>
<td>Are you satisfied with the progress that you are making toward the goals which you set yourself in your present position?</td>
<td>Yes - S 1 2 3 4 5</td>
<td>No - D</td>
</tr>
<tr>
<td>SALB2 123 54</td>
<td>Are you satisfied that the people of your community give proper recognition to your work as a manager of a cooperative?</td>
<td>Yes - S 1 2 3 4 5</td>
<td>No - D</td>
</tr>
<tr>
<td>SALB3 127 58</td>
<td>Are you satisfied with your present job when you consider the expectations you had when you took the job?</td>
<td>Yes - S 1 2 3 4 5</td>
<td>No - D</td>
</tr>
<tr>
<td>Item/ Anal.</td>
<td>Schedule file</td>
<td>var.</td>
<td>Item or question and code</td>
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</tr>
<tr>
<td>10. Salience (continued)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SALB4</td>
<td>128</td>
<td>59</td>
<td>Are you satisfied with the work that you do as the manager of a cooperative?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Yes - S</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>No - D</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>SALB5</td>
<td>133</td>
<td>73</td>
<td>I wish my board would move more quickly in making decisions so this business could keep up-to-date.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Yes - S</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>No - D</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>SALB6</td>
<td>157</td>
<td>124</td>
<td>To what extent do you feel the employees work here because they like the work and other employees versus working here because the pay is better?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

| 11. Tension | | |
| TENA1       | 505           | 136b | Degree of difficulty - satisfaction |
| TENA2       | 506           | 136b | Degree of difficulty - efficiency |
| TENA3       | 509           | 136c | Amount of pressure - satisfaction |
| TENB1       | 507           | 136b | Degree of difficulty - productivity |
11. Tension (continued)

| Item/Anala | Sched- | Item or question and code                  |
| quest. file | ule # |                                   |
| # | var. # |                                     |

| TENB2 | 510 | 136c | Amount of pressure - efficiency |
| TENB3 | 511 | 136c | Amount of pressure - productivity |

12. Role performance

| ADPA1 | 224 | 11 | In making a major decision what steps or processes do you go through? |
| ADPA2 | 223 | 9 | Do you seek any specialized outside help in the operation of this business to help you and the board make decisions and carry them out? |
|       |     | 10 | (IF YES TO QUESTION 9) |
|       |     | 10 | What type of specialized help do you use? |
| ADPA3 | 226 | 16 | What factors do you take into consideration in making decisions concerning how your business or organized into departments and functions? (Include decisions such as those concerning functions to be performed and departments to have.) |
| ADPA4 | 227 | 23 | What do you take into consideration in selecting your wholesale sources and outlets? |
12. Role performance (continued)

ADPA5 095  15  (IF YES TO QUESTION 14): Have you given any consideration to probable future sales trends in your trade area?

Which of the statements on CARD 5 best describes the methods you used?

a. made projections on the basis of personal judgment based on day-to-day knowledge of business potential .......................... 1
b. worked out potential sales on paper or mentally by using some of the available sales records in my business .......................... 2
c. worked out mentally the potential sales using business records and other available data ........................................ 3
d. worked out on paper the potential sales using business records and other available data ........................................ 4

ADPB1 225  13  Once a major decision to make a change has been made, what are some of the things you would do to insure that the implementation of this decision will be successful? Include planning for change, and planning for the period after the change has been made.

ADPB2 222  6  Have you ever used the field representatives of wholesale companies to assist you in this business? Include such things as: financial assistance, technical information, rental equipment, resale help, pamphlets and bulletin financing on credit for customers, pricing policy, etc.

   No . . . . . 1
   Yes . . . . . 2

7  (IF YES TO QUESTION 6):

   In what way(s) were they of assistance to you?
12. Role performance (continued)

<table>
<thead>
<tr>
<th>Item/Analasquest.</th>
<th>Schedule file var. #</th>
<th>Item or question and code</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td></td>
<td>How valuable do you feel this assistance has been?</td>
</tr>
<tr>
<td></td>
<td>1 2 3 4 5 6 7 8 9 10 11</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Please indicate how valuable you feel this assistance has been.</td>
</tr>
<tr>
<td>ADPB3</td>
<td>231</td>
<td>How do you protect yourself against market price changes on products and supplies in inventory?</td>
</tr>
<tr>
<td>ADPB4</td>
<td>093</td>
<td>In making a major decision, which of the statements on CARD 4 best describes the methods you use in evaluating alternatives?</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>a. rely solely on managerial judgment in making most decisions ........................................1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b. work out potential profits (expected sales and expenses) but do not have detailed records which can be used as a base ....................................................2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>c. work out potential profits (expected sales and expenses) from records mentally .....................3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>d. work out potential profits (expected sales and expenses) from records on paper ..................4</td>
</tr>
</tbody>
</table>

13. Net operating revenue

<table>
<thead>
<tr>
<th>Item</th>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NORA1</td>
<td>074</td>
<td>Total commodity savings 1969</td>
</tr>
<tr>
<td>NORA2</td>
<td>075</td>
<td>Total other income 1969</td>
</tr>
<tr>
<td>NORA3</td>
<td>078</td>
<td>Income-patronage refunds 1969</td>
</tr>
<tr>
<td>Item/quest. file #</td>
<td>Schedule var. #</td>
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### 13. Net operating revenue (continued)

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<td>Net operating revenue 1969 = (NORA1 + NORA2 - NORA3)/10,000</td>
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<td>NORB1</td>
<td>082</td>
<td>Total commodity savings 1970</td>
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<td>Income-patronage refunds 1970</td>
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<td>Net operating revenue 1970 (NORB1 + NORB2 - NORB3)/10,000</td>
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<td>NORT</td>
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<td>Average net operating revenue = (NORA + NORB)/2.0</td>
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### 14. Net savings

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<td>Average fixed assets = (SIZEA1 + SIZEA2)/2,000 and standardized</td>
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<td>(SIZEA + SIZEB)/2.0</td>
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APPENDIX B.

STANDARDIZATION PROCESS FOR THE VARIABLES OF THE

COOPERATIVE EFFECTIVENESS MODEL
Table B.1. Standardization process for the variables of the cooperative effectiveness model

<table>
<thead>
<tr>
<th>Stage of standardization</th>
<th>Transformation implemented</th>
</tr>
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</table>

Step one^a

\[
Z_{u_ia_jt_kn_p} = \frac{(X_{u_ia_jt_kn_p} - \bar{X}_{u_ia_jt_k})}{S_{u_ia_jt_k}}
\]

^a \bar{X}_{u_ia_jt_k} : Mean of variable \( u_i \), split \( a_j \) and item \( t_k \)

\( S_{u_ia_jt_k} \) : Standard deviation of variable \( u_i \), split \( a_j \) and item \( t_k \).
Table B.2. Standardization process for the variables of the cooperative effectiveness model. Step two

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<td>[ \bar{Z}<em>{u</em>{i}a_{j}n_{p}} = \frac{1}{m} \sum_{k=1}^{m} Z_{u_{i}a_{j}t_{k}n_{p}} ]</td>
</tr>
</tbody>
</table>

- \( \bar{Z}_{u_{i}a_{j}n_{p}} \) : Average standard score of variable \( u_{i} \) in split \( a_{j} \) and individual \( n_{p} \)
- \( m \) : Summation symbol for the \( m \) items in split \( a_{j} \)
- \( Z_{u_{i}a_{j}t_{k}n_{p}} \) : Standardized value for variable \( u_{i} \); split \( a_{j} \); item \( t_{k} \) and individual \( n_{p} \).
Table B.3. Standardization process for the variables of the cooperative effectiveness model.
Step three

<table>
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<th>Stage of standardization</th>
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</table>
| Step three               | \[
\bar{Z}_{u_1n_p} = \frac{2}{\sum_{a=1}^{2} (\bar{Z}_{u_1a_j})/2}
\] |

\(\bar{Z}_{u_1n_p}\) : Average standard score for the composite of \(u_1\) variable and individual \(n_p\)

\(\sum_{a=1}^{2}\) : Summation symbol over the average standard scores of each split in each composite for each individual \(n_p\)

\(\bar{Z}_{u_1a_j}\) : Average standard score of each split in each composite for each individual \(n_p\).
APPENDIX C.

CORRELATION AND DISPERSION MATRICES FOR LISREL IV
Table C.1. List of variables and corresponding indicators of the cooperative effectiveness model.

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<td>3. Elite consensus</td>
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Table C.2. Pearson correlation (above diagonal) and dispersion (diagonal plus below diagonal) matrices of Model Ia

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*aNames of the indicators are listed in Table C.1, Appendix C.*
Table C.2 (Continued)

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APPENDIX D.

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**Variables are designated as referenced in Table 2.**

*Significant at the .05 alpha level (two-tailed test).

**Significant at the .01 alpha level (two-tailed test).
Table D.3. Estimated coefficients, standard errors of the coefficients and t-values of the OLS and EIV solution to the respecified model of phase two (Model II). Dependent variables: Role performance, net operating revenue, net savings

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aVariables are designated as referenced in Table 2.
*Significant at the .05 alpha level (two-tailed test).
**Significant at the .01 alpha level (two-tailed test).
Table D.3. Estimated coefficients, standard errors of the coefficients and t-values of the LISREL solution to the respecified theoretical model in phase two (Model II). Dependent variables: Role performance, net operating revenue, net savings

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| STRD | .347** | .058 | 5.983 |
| SALT | .167** | .043 | 3.900 |

| NORT STRD | .863** | .067 | 12.90 |
| SALT | .070** | .020 | 3.48 |

*Variables are designated as referenced in Table 2.
*Significant at the .05 alpha level (two-tailed test).
**Significant at the .01 alpha level (two-tailed test).
Table D.4. Estimated coefficients specification error and corresponding standard errors and t-values of the LISREL solution to the revised theoretical model in phase three (Model III). Dependent variable: Role performance

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* Variables are designated as referenced in Table 2.

b SP.E.: Specification Error.

Significant at the .05 alpha level (two-tailed test).

** Significant at the .01 alpha level (two-tailed test).
APPENDIX E.

ESTIMATION OF $R^2$
Table E.1. Calculation of $R^2$ of the Errors-in-Variables and LISREL solution in Model I

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Table E.3. Calculation of $R^2$ of the LISREL solution in Model II

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