

The Use of Multiple Means of Change and Its Outcomes*

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The Problem

This paper is concerned with a small portion of the organizational improvement process. Studying the organizational improvement process encompasses such basic areas as (1) stimuli to change, i.e., things or events might lead initiation of the organizational improvement programs, (2) desired outcomes from the process, (3) the means or levers of change, (4) the implementation process of change, and (5) the actual outcomes of change (Quinn and Howes, 1977; Shirley, Peters, and El-Ansary, 1976). This paper deals with how the means or levers of change, the third area, and the actual outcomes of change, the last one. More specifically, it is concerned with the managerial practices of using combinations of (or multiple) means of change and their outcomes. The means or levers of change refer to the variables that managers use in initiating a change; the actual outcomes of change to the changes in the outcome variables that occur as a result of the implementation of the change (Rogers and Shoemaker, 1971 : 319).

Much has been written on the means or levers of change (Bartlett and Kayser, 1973; Howes, 1974; Leavitt, 1964; Quinn, 1978); many repor-

ted the results of case studies which involved multiple means of change (Adler and Goleman 1975; Huse and Beer, 1971; Nadler and Pecorella, 1975). But no in-depth study has been undertaken on the use of combinations of the means of change which tend to be manipulated together in a change and on its outcomes.

The purpose of this study is to provide answers to the following two questions:

- (1) Which means of change are frequently manipulated together in the process of organizational improvement?
- (2) What would the outcomes be that would result from the use of different types of multiple means of change?

The first question is concerned with the patterns of multiple means of change, that is, the clusters of the means of change which tend to be manipulated together, while the second one deals with the impact of different types of multiple changes as a whole. Since no detailed study has yet investigated these issues, this effort is primarily exploratory and descriptive.

Previous Research

The idea of using multiple means of organizational change is rather new. Lawrence and Lor-

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sch (1969) provided the first theoretical work suggesting the use of combinations of means of change. For example, in one kind of situation, they suggest a combination of structural and training interventions, while in another situation a combination of information sharing and an educational simulation exercise, and in still another situation a combination of information sharing with training. The desired outcome in these three situations was improvement in flexibility, coordination, and motivation, respectively. They cautiously suggest how the use of multiple means of change might be initiated:

It is dangerous to generalize about the selection of change methods, but the general guideline holds that one matches the method to the amount of behavior change that is needed

to close the gap. As the amount of desired behavior change increases, one can add additional change methods to secure the desired end results (Lawrence and Lorsch, 1969: 87).

An examination of empirical research on the use of multiple means of change indicates that no central focus on either types of multiple changes or outcome variables exists, and that a variety of different types of multiple changes appear to lead to positive change in outcome variables. This lack of focus makes it difficult to draw inferences about the effects of different types of multiple changes. Moreover, no study attempts to isolate the effect of a particular means of change upon outcome variables while holding constant other means of change.

Table 1 is a summary of the review of ten

Table 1. Use of Multiple Means of Change and Its Outcomes: Research Evidence

	Means of Change								Outcomes of Change								
	OS	GO	DM	TR	RP	WM	IN		EF	EY	MO	CO	QS	WQ	CS	EQ	RA
Malone (1975)	X		X	X		X	X		0	+/-				+	+		
Nadler & Pecorella (1975)	X		X	X			X		+		+	+					
Gibson (1973)	X		X	X		X					+						
Blain & Keohane (1969)	X		X		X						+	+	+				
Huse & Beer (1971)	X				X	X			+	+	+		+		-		+
Tichy & Nisberg (1976)			X			X				+	+			+		+	
Adler & Goleman (1975)		X		X					+								
Beckhard (1966)		X		X					+	+	+	+			-		+
Mosher (1967)	X			X							+	-	+				
Raia (1965)		X				X			+	+	+		+				

OS: Organizational Structure
 GO: Goal Setting
 DM: Decision-making & Information Process
 TR: Training
 RP: Replacement of Staff
 WM: Work Methods
 In: Incentives

EF: Effectiveness
 EY: Efficiency
 MO: Morale
 CO: Coordination
 QS: Quality of Staff
 WQ: Work Quality
 CS: Costs
 EQ: Equilibrium
 RA: Resource Acquisition

X's: Means of Change Used

+: Positive Association
 -: Negative Association
 0: No Association
 Blank: Not Studied

case studies(Tichy and Nisberg, 1976; Adler and Goleman, 1975; Malone, 1975; Nadler and Pecorella, 1975; Gibson, 1973; Huse and Beer, 1971; Blain and Keohane, 1969; Mosher, 1967; Beckhard, 1966; Raia, 1965) which report on the use of multiple changes. The table shows the means of change used and the achieved outcomes. For example, in the Nadler and Pecorella (1975) case, the means of change used were changes in organizational structure, training, decision-making processes and incentives, and improvement in effectiveness, morale and coordination resulted.

Of the ten studies, only two, Adler and Goleman(1975) and Beckhard(1965), report the effects of the same type of multiple changes: training and goal setting changes. All the other studies deal with different combinations of means of change. The number of multiple changes ranges from 2 to 5, averaging 2.9. The number of outcome variables reported ranges from 1 to 6, averaging 3.5. The most frequently reported outcome variable is morale. Only two studies, Malone(1976) and Mosher(1967), report negative as well as positive results.

In a nutshell, these studies provide a useful insight into the organizational improvement process by dealing with a rather understudied area, the use of multiple means of change in the very process, but they leave some problems untouched. That is, they do not allow one to draw any inference about the common patterns of multiple means of change and their relationship to specific outcomes. The current study aims at filling that gap.

The Study

The present study examines the managerial practices of using multiple means of change in relation to their outcomes. The study was under-

taken through a survey of managers in public organizations. The participants in the survey were asked in a questionnaire to select one change which had been completed and with which they were well acquainted. They were then asked to provide information about what was modified, i.e., the means of change and their relative importance as well as about what was actually obtained, i.e., the outcomes of change. A description of the participants in the study, the process of the questionnaire design and scale construction, and the validity and reliability of the instrument are discussed below.

Participants

The study involved 226 managers and administrators in public organizations(191 from state and local governments throughout the United States and 35 educational administrators in New York State), who were participants in organizational development(OD) workshops and courses conducted at the State University of New York at Albany and some other campuses in New York State. They were given the opportunity to participate voluntarily in the current study. Since this study is concerned with the manager as an entrepreneur who acts as an initiator and designer of the planned change, these participants represent an appropriate sample for the purpose of the study.

Of the sample base of 226, 146 questionnaires were completed within the context of the workshop, while 80 questionnaires were mailed subsequently. The mail response rate was 55%, yielding 44 completed questionnaires. Of this total of 190 questionnaires, 159(84%) were judged to be usable. To be usable both the proportion of missing values and careless markings, e.g., ones which did not follow instructions, must not have exceeded 30% of the total items. The 159 respondents included 102 managers in state and local employment and job security

agencies; 33 other public executives; and 24 educational administrators. An analysis of variance on measures of organizational and environmental characteristics was conducted to see if these three groups were homogeneous. As a result, the 24 cases from the educational sector were dropped from the study because they appeared to be different from the rest; 4 out of 5 significant differences across groups were due to the different nature of the educational sector. Consequently, the study is based on information provided by the 135 respondents.

Seventy-seven percent of the participants were middle or first-line managers; 86% were between 30 and 60 years of age; 78% possessed a Bachelor's degree or higher; and 79% had 10 or fewer employees directly reporting to them.

Questionnaire Design

The data gathering instrument was designed to examine the common patterns of multiple means of change and to measure the relationships between the means and outcomes of change. Since three previous studies contributed to the development of the instrument, they are briefly described below.

1. **Quinn (1978).** Quinn conducted a survey of top administrator in state government organizations using the critical incident technique. In an effort to identify basic dimensions of the means and outcomes of change and to determine their relationships, Quinn asked the respondents think about the one most outstanding productivity success or improvement action they had taken and to respond to the items measuring the means and outcomes of change.

Based on the information provided in the questionnaires, Quinn created 8 scales of the means of change and 6 scales of the outcomes of change. They were as follows:

The means of change:

- (1) Work methods-technology

- (2) Information dissemination
- (2) Structural reorganization
- (4) Retraining-replacement
- (5) Authority system
- (6) Objective setting-measurement
- (7) Workflow
- (8) Programs

The outcomes of change:

- (1) Improved output process
- (2) Improved motivational climate
- (3) Improved resource acquisition
- (4) Improved coordination
- (5) Increased savings
- (6) Improved equilibrium

These categories of the means and outcomes of change provided a foundation for the development of the instrument used in the current study.

2. **Quinn and Howes (1977).** Quinn and Howes conducted an interview of middle and upper-middle level managers in various agencies of New York State government. Based on the information provided by 90 respondents to their questions, Quinn and Howes content coded the means of change into 6 types and the outcomes of change into 14 types. They were as follows:

The means of change:

- (1) Organizational structure
- (2) Work methods and processes
- (3) Information and decision processes
- (4) Staffing patterns
- (5) Training
- (6) Goals

The outcomes of change:

- (1) Control
- (2) Coordination
- (3) Efficiency
- (4) Flexibility
- (5) Morale
- (6) Quality of outputs
- (7) Quantity of outputs
- (8) Timeliness of outputs
- (9) Savings
- (10) Stability
- (11) Image
- (12) Quality of staff
- (13) Workload
- (14) Resources

3. **The pilot study.** Simultaneously with the

Quinn and Howes study a pilot study was undertaken using an instrument developed on the basis of findings from Quinn (1978). The questionnaire included 98 items which were designed to measure 11 dimensions of the means of change and 8 types of the outcomes of change. They were as follows:

The means of change:

- (1) Change in the decision-making processes
- (2) Change in the organizational structure
- (3) Change in the goal setting and evaluation processes
- (4) Change in work methods
- (5) Change in training
- (6) Change in the incentive system
- (7) Change in the staffing procedures
- (8) Change in the cost of operation
- (9) Change in the relations between subunits
- (10) Change in the internal communication
- (11) Change in the external communication

The outcomes of change:

- (1) Change in savings
- (2) Change in the external image
- (3) Change in resources
- (4) Change in cooperation and coordination
- (5) Change in the utility of outputs
- (6) Change in morale
- (7) Change in responsiveness
- (8) Change in stability

These means and outcomes of change included all the factors of the means and outcomes of change identified by Quinn(1978), but were organized differently.

The respondents were asked to think about the one change that most improved their unit, to briefly describe the kind of change they made and its outcomes, and to respond to the items measuring the means and outcomes of change. For the means of change, the items which were designed to measure a factor were grouped together under the name of the factor. The extent of modifications in the items was to be rated on a Likert-type 5-point scales. On the other hand, each item designed to measure the outcomes of change was to be rated on 7-point

semantic differentials, e.g., decreased-increased; worse-better. Preliminary analyses revealed (1) that public managers frequently manipulated multiple means of change, (2) that some items measuring the means of change needed to be directionally stated, and (3) that some mechanism had to be devised to obtain more variation in the responses on the outcome variables. These findings have been reflected in the design of the present study.

The basic dimensions of the means and outcomes of change which were measured in the present study were essentially the same as those identified by Quinn(1978) and Quinn and Howes (1977), but organized somewhat differently. For example, a type of the means of change, change in the incentive system, has been separated from the category of change in the organizational structure; and a type of the outcomes of change, effectiveness, has been treated as independent of equilibrium or stability. As a result, seven types of the means and fifteen types of the outcomes of change are included in the present study. They are as follows:

The means of change:

- (1) Change in the organizational structure
- (2) Change in work methods and processes
- (3) Change in the decision-making and information processes
- (4) Provision of training
- (5) Change in goals
- (6) Change in the incentive system
- (7) Change in staffing patterns

The outcomes of change:

- (1) Change in controllability
- (2) Change in coordination
- (3) Change in efficiency
- (4) Change in morale
- (5) Change in quality of outputs
- (6) Change in quantity of outputs
- (7) Change in workload
- (8) Change in quality of staff
- (9) Change in timeliness
- (10) Change in stability
- (11) Change in prestige

- (12) Change in responsiveness
- (13) Change in savings
- (14) Change in effectiveness
- (15) Change in resources

The questionnaire included 10 demographic variables and 80 items which were designed to measure the means and outcomes of change; 35 for the former and 45 for the latter. It was expected that it would take 45 minutes to an hour to complete the questionnaire. Some characteristics or differences of the instrument used in this study from previous ones are noted here. First, the type of critical incident on which the respondents were asked to report was altered. Rather than describing the one change which most improved their unit, the respondents were asked to provide information about the change, whether successful or unsuccessful, with which they were most familiar. It was hoped that this revision would provide more variation in the measures of the outcomes of change.

Second, the means of change included 18 paired-opposite, 12 unidirectional, and 5 non-directional items. The paired-opposite items were included based on the findings by the pilot and the Quinn and Howes studies that some types of the means of change, e.g., the organizational structure and the information and decision processes, were being manipulated in opposite directions. For example, some managers shared the decision-making authority with others, while other managers attempted to concentrate it in the hands of fewer people. By transforming some of the non-directional items identified by Quinn and Howes into items with opposite directions, the researcher hoped to better measure the dimensions of the means of change.

Third, in the instrument the respondents were asked first to check those items describing what had been changed or modified and then to rate the importance of only checked items relative to the others checked. They were to rate the items

on the 5-point scales (1 being of little importance; 5 being of extreme importance). If the item was not checked at all, it was given a score of zero (0). Appendix A illustrates the way that the means of change were measured.

Fourth, as to the outcomes of change, the respondents were asked to rate the degree of achievement in specific percentage figures (15 items) and on the Likert-type scales (30 items). The percentage scales were an attempt at obtaining more variation in the measure of outcome variables. The percentage figures were transformed into the 5-point scales (1 indicating "decreased"; 2 "stayed about the same"; 3 "increased" by 1 to 24%; 4 "increased" by 25 to 50%; and 5 "increase" by 51% or over); rectangular distribution was sought in the transformation process. When rating the items of the outcomes of change on the Likert-type scales, the respondents again were asked to check those outcome items that described what happened and then to rate the extent to which only each checked item happened on 5-point scales (1 being to a very small extent and 5 being to a very great extent). Appendices B and C illustrate the way that the outcomes of change were measured.

Scale Construction

Since the 35 items of the means of change and the 45 items of the outcomes of change were intended to measure only a few meaningful dimensions, scale construction was performed. Basic groups of variables were located that shared about 10% of their variance in common ($r = .30$). These clusters of variables were then subjected to repeated item analyses. The main criteria in constructing a scale were (1) maximizing the reliability or internal consistency of the scale measured by Cronbach's alpha, (2) maximizing criterion-related validity of the scale measured as the correlation between a constructed scale and its individual items (Bohrstedt, 1969), (3)

maximizing the discriminant validity of the scale measured as the lack of correlation between two constructed scales (Bohrnstedt, 1969), and (4) maximizing the conceptual interpretability or clarity of the scale. As a result, 7 scales for the means of change and 5 scales for the outcomes of change were constructed. Five items measuring several means of change and one outcome item which were relatively uncorrelated with the constructed scales were included in the later analyses as single-item scales. Thus, 12 types of means of change (7 multiple-item scales and 5 single-item scales) and 6 types of outcomes of change (5 multiple-item scales and 1 single-item scale) were included in the present study. They are as follows:

Means of change:

- (1) *Creation of new units or programs* refers to creating new units or programs. This type of change might also involve reassigning duties and responsibilities of affected members and physical relocation of people, facilities or equipments.
- (2) *Introduction of a goal setting process* refers to clarifying or changing goals and objectives, by introducing a management-by-objectives system, for example.
- (3) *Decentralization of the decision-making process* refers to sharing the decision-making authority by either involving the lower-level personnel in the decision-making process as in participative management or by separating a large unit into a few small unit.
- (4) *centralization of the decision-making process* refers to the opposite construct to (3). It may involve concentration of power in a few people or consolidating a few units into a unit.
- (5) *Provision of training* refers to providing various educational activities, such as T-group training, inservice training, etc.
- (6) *Introduction of more lenient rules* refers to introducing more lenient rules and policies, such as eliminating time clocks, avoiding frequent inspections, etc.
- (7) *Introduction of tighter control* refers to the opposite of (6). It may involve introdu-

cing more stringent rules and policies, such as instituting a performance evaluation process.

- (8) *Increased information sharing* refers to disseminating more information among members of the organization.
- (9) *Addition of staff* refers to adding new people to the present manpower.
- (10) *Reduction of staff* refers to the opposite of (9).
- (11) *Computerization of the work* refers to computerizing some aspects of the work.
- (12) *Introduction of incentives* refers to providing more incentives or rewards for better performers of better performing groups or units.

Outcomes of change:

- (1) *Change in the external image* refers to an improvement in the prestige or reputation of the organization by way of producing outputs of better quality.
- (2) *Change in economy-savings* refers to the resources conserved.
- (3) *Change in control-coordination* refers to an improvement in the ability to control and coordinate work and people.
- (4) *Change in workload-quantity of outputs* refers to an increase in the level of workload outputs.
- (5) *Change in morale* refers to an increase in the level of morale, commitment, and satisfaction of members of the organization.
- (6) *Change in the quality of staff* refers to an increase in the proportion of members capable of new, different, or required tasks.

Validity and Reliability of the Instrument

Both criterion-related and discriminant validity and reliability estimates were obtained following collection of the data. Every effort was exerted to create scales that were valid, discriminating and reliable. The final result of the effort is shown in Appendix D through Appendix G. Appendixes D and E show two statistics: (1) Crobach's alpha, a measure of internal consistency, both for each constructed scale and the overall means and outcomes of change as concepts; and (2) item-to-total correlations, a mea-

sure of criterion related validity, whereas Appendixes F and G show intercorrelations among the constructed multiple-and single-item scales, indicators of discriminant validity. The reliability estimates range from .41 to .68 for the scales of the means of change and .62 to .72 for the scales of the outcomes of change; those for the means and outcomes of change each as a concept are .69 and .80, respectively. Most alphas provide evidence of the reliability of the measures of the means and outcomes of change. The internal consistency index for the scale of centralization of the decision-making process and structure is low (Cronbach's alpha=.41), however. It was decided to keep it as a multiple-item scale for two reasons: (1) the two items forming the scale shared about 10% of their variance; and (2) the items were conceptually compatible. The item-to-scale total correlations are all above .60 except the correlation between standardization of the work and the scale of tighter control. The item was included in the scale primarily because it was conceptually compatible with other items in the same scale and because it helped improve the reliability of the scale.

When discriminant validity is measured as the lack of correlation between the scales, Appendixes D and E provide evidence of the validity of the measures of the means and outcomes of change. The average correlation (following transformations of r 's to Fisher's z 's) among the scales of the means and among the outcomes of change is .13 and .21 (less than 5% of variance shared), respectively.

Findings

The Patterns of Multiple Means of Change

The question was stated as follows:

Which means of change are frequently ma-

nipulated together in the process of organizational improvement?

The approach taken for this task was to further examine the correlations among the means of change shown in Appendix F which supported the assumption that managers manipulate multiple means of change. For the present analysis, the means of change were considered to occur together if the correlation coefficient was statistically significant at the .05 level ($r=.14$). It was inferred that such statistically significant relationships between the means of change occurred because of their natural tendency to be frequently manipulated together notwithstanding the fact that the scales were created so as to minimize intercorrelations. On the basis of Appendix F a "correlation tree" was constructed by connecting any two means of change that were thus related (as shown in Figure 1). From the correlation tree 25 combinations of means of change were derived: 18 dyads, 6 triads, and 1 tetrad. No combination involving more than four means of change was identified from the present data. The 25 combinations of means of change are as follows:

(1) *Dyads*

- a. Creation of new units or programs (hereafter referred to as "*New Unit*") + Introduction of a goal setting process (hereafter referred to as "*Goal Setting*") ($r=.19$)
- b. *New Unit* + Decentralization of the decision-making process and the structure (hereafter referred to as "*Decentralization*") ($r=.29$)
- c. *New Unit* + Centralization of the decision-making process and the structure (hereafter referred to as "*Centralization*") ($r=.22$)
- d. *New Unit* + Provision of training (hereafter referred to as "*Training*") ($r=.29$)
- e. *New Unit* + Addition of staff ($r=.17$)
- f. *New Unit* + Reduction of staff ($r=.14$)
- g. *Goal Setting* + *Training* ($r=.26$)
- h. *Goal Setting* + Introduction of tighter control (hereafter referred to as "*Tighter*")

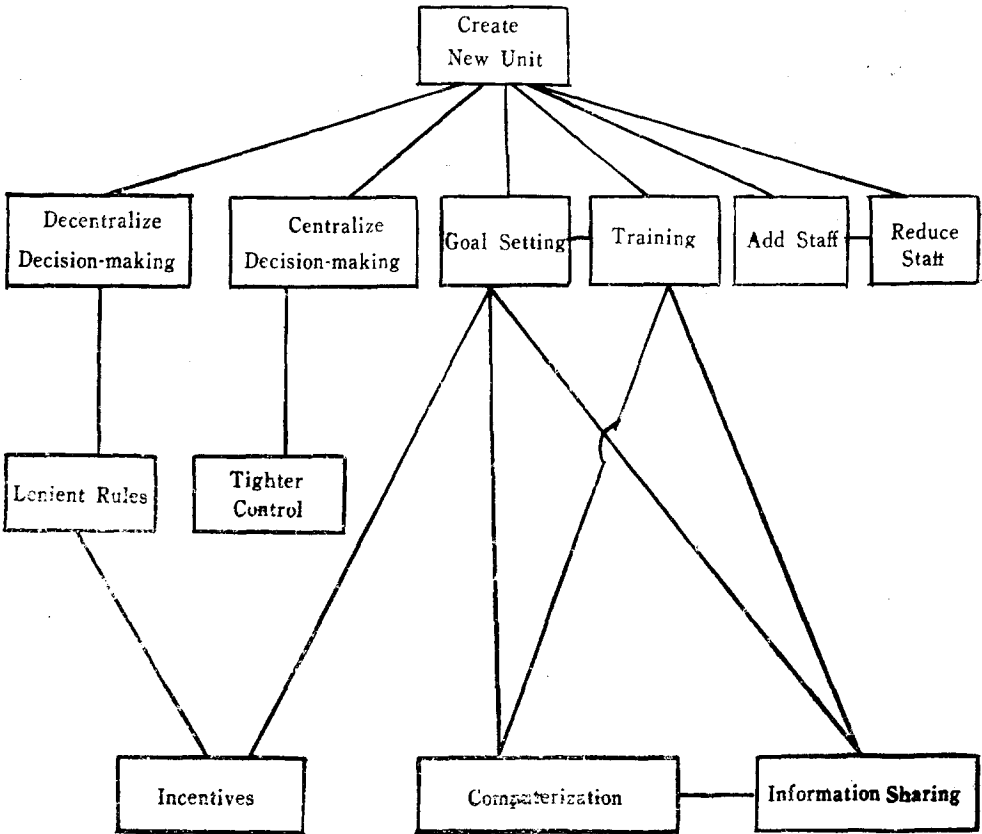


Fig. 1. Correlation tree

- Control") ($r=.27$)
- i. Goal Setting + Increased information sharing ($r=.22$)
 - j. Goal Setting + Computerization of work ($r=.16$)
 - k. Goal Setting + Introduction of incentives ($r=.24$)
 - l. Decentralization + Introduction of more lenient rules (hereafter referred to as "More Lenient Rules") ($r=.23$)
 - m. Centralization + Tighter Control ($r=.16$)
 - n. Training + Increased information sharing ($r=.33$)
 - o. Training + Computerization of the work (hereafter referred to as "Computerization") ($r=.40$)
 - p. More Lenient Rules + Introduction of incentives ($r=.19$)
 - q. Increased information sharing + Computerization ($r=.21$)
 - r. Addition of staff + Reduction of staff ($r=.25$)
- (2) Triads

- a. New Unit + Goal Setting + Training
 - b. New Unit + Addition of staff + Reduction of staff
 - c. Goal Setting + Training + Information sharing
 - d. Goal Setting + Training + Computerization
 - e. Goal Setting + Information sharing + Computerization
 - f. Training + Information sharing + Computerization
- (3) Tetrads
- a. Goal Setting + Training + Information sharing + Computerization

The Outcomes of the Use of Different Type of Multiple Means of Change

The question was stated as follows:

What would the outcomes be that would result from the use of different types of multiple means of change?

This section is divided into two subsections. The first deals with the clusters of managerial

reports of multiple means of change and the second with the outcomes that these clusters obtained.

Clusters of managerial reports of multiple means of change.

Five groups of respondents were identified who followed a similar pattern in manipulating multiple means of change. The steps taken are presented here. First, the respondents were characterized according to the extent to which they manipulated a particular means of change. It was arbitrarily established that managers made a major change if their standardized scale score was 30⁽¹⁾ or greater; they made a minor change if they scored between $-.29$ and $.29$; and they made no change if they scored $-.30$ or less. Second, respondents were selected who made multiple major changes, the patterns of which were identified earlier in this chapter.

In order to focus on a few central changes, a

rule was applied that the respondent should have reported only major changes in fewer than $2n$ scales, n being the number of means of change in a specific pattern of multiple changes. Thus, if the pattern of change identified included two specific changes (e.g., goal setting and tighter control), then no respondent who reported four or more changes would be included in the cluster. Four meaningful clusters of respondents resulted. Finally, a group of respondents who made no major change in any scales but minor change in one or two scales were identified to use as a comparison group. Thus, five clusters of respondents are examined in this subsection. Table 2 shows where the major change emphasis was placed by each cluster of public managers. The far right column shows the F-ratios from the analyses of variance which were performed to characterize the clusters. A Scheffe test was used to indicate the specific location of significant differences in average scale scores between

Table 2. Differences in Emphasis on Various Means of Change among 5 Clusters of Public Managers

Means of Change	Clusters					F-Ratio
	I (N=14)	II (N=8)	III (N=6)	IV (N=6)	V (N=8)	
Creation of New Unit	.15 _{ab}	.83 _a	-.60 _{ab}	-.44 _{ab}	-.90 _b	5.53***
Goal Setting	.93 _a	-.71 _b	1.21 _a	-.52 _b	-1.03 _b	27.38***
Decentralization	-.03	-.05	-.68	-.68	-.60	1.31
Centralization	-.10 _b	-.12 _b	-.58 _b	1.56 _a	-.63 _b	6.01***
Training	1.32 _a	-.07 _b	-.61 _b	-.67 _b	-.90 _b	18.30***
Lenient Rules	-.13	-.37	-.37	-.37	-.37	.80
Tighter Control	.02 _{ab}	-.47 _b	1.90 _a	1.35 _a	-.44 _b	5.95***
Information Sharing	.90 _a	-.33 _{ab}	-.27 _{ab}	-.83 _b	-.70 _b	8.40***
Addition of Staff	-.37 _b	1.15 _a	-.54 _b	-.54 _b	-.54 _b	8.23***
Reduction of Staff	-.24 _b	.92 _a	-.39 _b	-.39 _b	-.39 _b	3.21*
Computerization	1.20 _a	-.45 _b	-.45 _b	-.12 _{ab}	-.45 _b	6.22***
Incentives	-.36	-.36	.57	.17	-.36	1.90

Note.—Subscripts within each row refer to average scale scores which differ at $p \leq .05$ from scores in that row with different subscripts by the Scheffe test; thus a is significantly different from b, but ab is not significantly from either.

* $p \leq .05$
** $p \leq .001$

(1) The .30 would roughly correspond to the case that made changes in 2 out of 3 items in a scale.

clusters.

Public managers in the first cluster (Cluster I) mainly worked on at least 3 out of the following 4 means of change: (1) GOAL SETTING, (2) TRAINING, (3) INFORMATION SHARING, and (4) COMPUTERIZATION. Little or no change was made in other means of change. Cluster I managers attempted the most comprehensive change in terms of the number of means of change manipulated in the process of organizational improvement. The type of changes employed by this cluster might be found where a manager introduces a goal setting process in the unit, computerizes the information system to better assess the performance of the unit in terms of the set goals, provides training for the staff to become familiar with the information system newly installed, and distributes the increased available information among staff. We would call this type of changes "MANAGEMENT INFORMATION SYSTEM-CENTERED." The name is meant to connote rather comprehensive and integrative changes.

Cluster II managers made at least 2 major changes out of the following 3 means of change: (1) CREATION OF NEW UNIT/PROGRAM, (2) ADDITION OF STAFF, and (3) REDUCTION OF STAFF. Little or no change was made in other means of change. This type of changes might be found where a manager establishes a new unit or institutes a new program and adds new staff while replacing existing members. We would call the type of changes employed by Cluster II managers "STRUCTURE-CENTERED."

Managers who put their primary emphasis in organizational improvement effort on GOAL SETTING and TIGHTER CONTROL with minor emphasis on INCENTIVES formed Cluster III. Little or no change was made in other means of change. This type of changes might be found where a manager installs goal setting and per-

formance evaluation processes as in the case of introducing a typical management by-objectives system. Positive incentives (e. g., sharing of the savings) might have been promised. We would call the type of changes employed by Cluster III managers "GOAL SETTING-EVALUATION-CENTERED."

Cluster IV managers made major changes in CENTRALIZATION and TIGHTER CONTROL with minor change in INCENTIVES. Little or no change was made in other means of change. Changes of this type might be found where a manager concentrates the decision-making authority in the hands of a few on the top and tightens up control over what goes on in the unit. The manager might also institute positive incentives based on performance. We would call the type of changes employed by Cluster IV managers "CONTROL-CENTERED."

Cluster V managers made no major change in any means of change, but made minor change in two means of change. However, as shown in Table 15, there is no focus on any particular means of change across the cluster. This cluster of managers will be used as a comparison group. We would call this type of change employed by Cluster V managers "NO MAJOR CHANGE."

Five types of multiple changes and their outcomes.

The t-tests were performed to examine how these five types of multiple means of change performed on the 6 types of outcomes of change. Since the size of the sample in each cluster was very small and since all the respondents reported their successful intervention effort, the level of significance was set at .01. The test statistic was

$$t_{n-1} = \frac{\bar{X} - \mu}{\sqrt{\frac{s^2}{n-1}}}$$

where

\bar{X} = arithmetic mean

μ =a set value

s =sample standard deviation

n =size of the sample

One-tail tests were chosen since the researcher was interested in finding out whether any improvement in the outcome variables was achieved by each cluster of managers. For each outcome of change a μ was calculated in such a fashion that it would represent the value of "no improvement" or "stayed about the same" on the outcome dimension. If the test statistic was greater than the critical value, it was judged

that statistically significant improvement had been made in that particular outcome. Table 3 shows the results of the t-tests performed on the data.

In general, the data shown in Table 3 indicate the superiority of the major change groups (Cluster I through Cluster IV) to the minor change group (Cluster V) in terms of achievement in the 6 types of outcomes of change. The 18 out of 20 t-values in Cluster I through Cluster IV are higher than those in Cluster V when they are read row-wise. The 2 t-values: one in

Table 3. Performance of the 5 Clusters of Managers on Measures of the Outcomes of changes

	Management Information System-Centered (N=14)		Structure-centered (N=8)		Goal setting-evaluation-centered (N=6)		Control-centered (N=6)		No major change (N=8)	
	\bar{X}	t	\bar{X}	t	\bar{X}	t	\bar{X}	t	\bar{X}	t
Control-Coordination	1.53*	5.88	1.94*	6.51	2.17*	7.75	1.86*	4.65	.74*	3.26
External Image	1.50*	5.14	1.15*	3.51	1.80*	4.00	1.17	2.59	.78	2.19
Morale	1.88*	9.23	1.73*	4.35	1.86	2.86	1.32	3.10	.55	2.21
Economy-Savings	.60*	2.74	.31	.60	1.15	2.13	1.15	1.54	.15	.97
Workload-Quantity of Outputs	1.75*	5.83	1.13	2.63	.55	1.14	1.13	2.36	.22	.41
Quality of Staff	.83*	3.25	.77	1.96	.53	.86	-.02	—	.21	.71
Critical Values of t for .01 Level of Singificance for One-tail Test	2.65		3.00		3.27		3.37		3.00	

* $p \leq .01$

Cluster II in the economy-savings row and the other in Cluster IV in the quality of staff row are lower than those in Cluster V. The data seem to indicate that STRUCTURE-CENTERED change is the least desirable in increasing economy-savings and that CONTROL-CENTERED change is the least desirable in raising quality of staff. The data also indicate that even within the major change groups, the more means of change are manipulated, i.e., the more comprehensive the intervention is, the more effective the intervention might be in terms of the number of outcomes of change improved. For exam-

ple, Cluster I managers who manipulated 4 means of change achieved statistically significant improvement in all 6 types of outcomes, while Cluster III and Cluster IV managers who manipulated 2 means of change achieved significant improvement in two outcome variables and in one, respectively.

Turning now to the specifics, the data shown in Table 3 indicate that all 5 clusters of managers were successful in achieving better control-coordination. It is interesting to note Cluster V managers who did not make any major change in any means of change, but made minor change.

in two means of change achieved significant improvement in control-coordination. This might have occurred because they too reported a successful intervention and because their purpose of an organization improvement program might have been to achieve better control-coordination.

These two reasons seem to be applicable to all the clusters of managers, judging from the fact that none of them failed to achieve better control-coordination. An examination of the t-values seems to further indicate that Cluster I through Cluster IV managers might have been more effective than Cluster V managers in achieving better control-coordination and that especially Cluster III managers might have been most effective and Cluster V least effective in achieving better control-coordination. The findings seem to suggest that major change groups are more effective than the minor change group in achieving better control-coordination.

The data also indicate that Cluster I through Cluster III managers achieved significantly high improvement in external image. A close examination of the t-values appears to suggest that the types of multiple changes that contained more means of change were more effective than other types in improving external image. The findings generally appear to suggest that the more means of change are manipulated or the more comprehensive the intervention is, the more effective the intervention might be in improving external image.

The data shown in Table 3 also indicate that Cluster I and Cluster II managers were successful in improving morale. A close look at the t-values reveals that Cluster I managers who manipulated the most means of change were the most effective in improving morale. This appears to suggest that the more comprehensive the intervention is, the more effective it might be in enhancing morale.

The data also indicate that only Cluster I

managers were able to achieve significant improvement in economy-savings, workload-quantity of outputs, and in quality of staff. The data seem to indicate that the more means of change are manipulated, the more outcomes of change can be improved.

DISCUSSION

Upon reviewing ten case studies which dealt with the use of multiple means of change, the researcher concluded that any combinations of the means of change could be employed in the process of organizational improvement. However, the data in the current study indicate that some means of change tend to cluster together with certain other means of change. The 25 combinations of the means of change listed in the foregoing section demonstrate such a tendency.

The data also revealed an interesting pattern in the outcomes which resulted from the use of multiple means of change: that is, the more means of change were manipulated, the more types of outcomes improved. It would be valuable to know how the results came about. But, since no attempt was made to determine the relative importance of each means of change in the different combinations, it is very difficult to provide definite answers to this question. However, it appears to point to the general guideline that one needs to work on a more comprehensive set of means of change in order to bring about improvement in a number of outcome variables. In this sense, the current data seem to conform to the argument made by Lawrence and Lorsch (1969) that as the amount of behavior change increases, one can add additional change methods to secure the desired end results. Nevertheless, since the effort was primarily exploratory, further research is warranted to better understand the practice of using multiple means of change.

Limitations

First, since the sample was not randomly selected and since most respondents came from state and local employment agencies, the findings of this study should be accepted with caution and should be regarded as tentative.

Second, the findings of this study are susceptible to the limitations of the studies which are based on the perceptions of the respondents.

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Appendix D
Scales of the Means of Change

	Cronbach's Alpha for Scale	Item-to-Scale Total Correlations	Cronbach's Alpha for Instrument	Item-to-Total Instrument Correlations
<i>Means of Change</i> (Multiple-Item Scales)			.69	
1. <i>Creation of New Units</i>	.68			
Physical relocation		.75		.30
Creation of new units		.74		.48
Reassignment of duties		.70		.35
Creation of new programs		.67		.46
2. <i>Goal Setting Process</i>	.62			
Change of goals or priorities		.76		.37
Clarification of goals		.76		.47
Introduction of an objective setting process		.74		.51
3. <i>Decentralization of the Decision Making Process</i>	.68			
Decentralization of the Decision-making process		.87		.39
Differentiation, separation		.87		.29
4. <i>Centralization of the Decision-Making Process</i>	.41			
Centralization of the decision-making process		.79		.24
Integration, consolidation		.79		.21
5. <i>Training</i>	.68			
Provision of retraining		.79		.53
Provision of technical training		.79		.46
Provision of human relations training		.75		.38
6. <i>More Lenient Rules</i>	.56			
Introduction of more lenient rules		.83		.26
Reduced controls		.83		.23
7. <i>Tighter Control</i>	.58			
Increased controls		.68		.23
Introduction of more stringent rules		.60		.14
Introduction of a performance evaluation process		.60		.51
Tightening of information flow		.60		.30
Standardization of the work		.57		.12
(Single-Item Scales)				
8. <i>Information Sharing</i>				.36
9. <i>Addition of Staff</i>				.23
10. <i>Reduction of Staff</i>				.31
11. <i>Computerization of the Work</i>				.39
12. <i>Introduction of Incentives</i>				.25

Appendix E
Scales of the Outcomes of Change

	Cronbach's Alpha for Scale	Item-to-Scale Total Correlations	Cronbach's Alpha for Instrument	Item-to-Total Instrument Correlations
<i>Outcomes of Change</i>			.80	
(Multiple-Item Scales)				
1. <i>External Image</i>	.70			
The image, reputation, prestige		.81		.61
The image, visibility, reputation		.80		.61
Compliments from the outsiders about the quality of service		.76		.45
2. <i>Economy-Savings</i>	.65			
The conservation of resources		.74		.60
Units of service/cost		.72		.46
Units of service/hour		.67		.31
The amount of dollars saved		.66		.24
3. <i>Control-Coordination</i>	.72			
The ability to control the unit		.78		.52
The ability to plan, control or regulate what goes on		.77		.53
Coordination, smoothness of work flow, communication		.73		.61
The proportion of crises, disturbances, or interruptions to be handled		.68		.38
4. <i>Workload-Quantity of Outputs</i>	.71			
The amount of work to be done		.84		.32
The workload		.83		.46
Units of service produced		.72		.52
5. <i>Morale</i>	.62			
Morale, commitment, task interest or satisfaction		.81		.54
The stability of the unit		.77		.56
The number of unit members making spontaneous improvement suggestions		.68		.45
(Single-Item Scales)				
6. <i>Quality of Staff</i>				
The proportion of members capable of new, different, or required tasks				.38