

Developing a Feedback System for Work Units: A Field Experiment in Structural Change*

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This study examines the effects of introducing an ongoing feedback system into 10 branches of a Midwestern bank. The feedback system was designed to facilitate collaborative control and problem solving in the branches and was hypothesized to raise the level of participation in the branches and increase their effectiveness.

The effects of the new feedback system were evaluated by observing its use and by comparing questionnaire and archival information from the experimental branches with similar data collected from 10 branches where the feedback system was not implemented.

The results of the study indicated that the new feedback system produced functional consequences in some of the work groups in the experimental branches, but not in others. It appeared that in some cases the consequences were due to an increase in participative control processes, while in others, they were due to an increase in directive management. It is concluded that the effects of different feedback system designs are probably contingent on contextual factors such as the problem-solving skills and orientations of organization members, the nature of the reward systems existing in the organization, and task and individual differences among work units.

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Managers have realized for some time that a potentially powerful change tool exists in the formal design of an organization (see, for example, Chandler, 1962). Similarly, organizational theorists and researchers have identified organization design as an important leverage point (Thompson, 1967; Lawrence & Lorsch, 1967, 1969; Galbraith, 1973; Kilmann, Pondy & Slevin, 1976). While there has been a growing emphasis on concepts of organization design, less attention has been given to how structural changes might be implemented most effectively. With the exception of the work in the area of individual and group job design (Hackman, 1977; Susman, 1976; Walton, 1972, 1975), there have been relatively few discussions of the problems of developing and implementing structural changes in organizations (for some examples see Lawrence, 1958; Luke, Block, Davey & Averch, 1973; Davis & Lawrence, 1977).

Organizational theorists have viewed information as a critical construct in the understanding and development of organizational structures (Weick, 1969; Galbraith, 1973, 1977; Tushman & Nadler, 1978). One fruitful approach to organization change may therefore be to make changes in the informational structure of the organization or its subunits, particularly the information or control systems.

This paper reports a study aimed at increasing understanding of the process of bringing about changes in the informational structure of an organization. It addresses the question of how changes in information flows affect organizational behavior.

Information and Behavior

Two different bodies of theory, research, and experience lead to the conclusion that information affects organizational behavior and that information is a potentially powerful change tool. The first body of work pertains to data-based change, and in particular survey feedback. The second body of work is the managerial control system literature.

Organizational researchers have known for some time about the impact that information can have on behavior. Starting with the first survey feedback experiments (Mann & Likert, 1952; Mann, 1957; Baumgartel, 1959), a major component of most planned organizational change work has been the collection of valid data that can be used to facilitate change. The research in this area indicates that providing individuals and groups in organizations with information about their behavior and its perceived consequences can serve as a catalyst for change, and can direct energy towards solving specific problems (see discussions in Bowers & Franklin, 1977; Nadler, 1977).

Studies of managerial control systems have also indicated the impact of information on behavior. Control systems are mechanisms that

regularly gather data on the accomplishment of an organization's objectives and channel the resulting information to a predefined network of organizational members. Research has indicated that the nature and use of control systems can affect formal organization structure and the distribution of power among organization members (Katz & Kahn, 1966), managerial coordination and the integration of sub-unit activities (Galbraith, 1973; Tushman & Nadler, 1978), interpersonal relations (Argyris, 1952; Mumford & Banks, 1967), and the motivation of groups and individuals (Blau, 1956; Hofstede, 1967; Stedry & Kay, 1964).

For some time, those who have studied control systems have realized that it is not the informational channel that brings about patterns of behavior. Rather, the information has impact through the facilitation of *control processes* which include (a) *setting goals* for future performance, (b) *acquiring feedback* on the extent to which goals are being met, and (c) *solving problems* that are identified by feedback information. It is these control processes combined with the extrinsic and intrinsic rewards associated with measured performance (Lawler & Rhode, 1976; Cammann, 1976; Caplan, 1971) that bring about changes in performance of individuals or groups.

Designing a Hybrid Intervention

Both survey feedback and traditional control systems have limitations. The effects of survey feedback are inconsistent for the following reasons: The intervention occurs only once, its focus is on process rather than outcome variables, and it is not linked with important organizational design factors, such as reward systems or structural change (Nadler, 1976). Similarly, a number of theorists have noted that traditional control systems can produce dysfunctional employee responses and other unintended or negative consequences (Argyris, 1964; Blau, 1956; Cammann, 1976; Jasinski, 1956). As an alternative, they have advocated the design of collaborative control systems that would measure process, as well as performance, and distribute information to the individuals responsible for performance as well as to their managers. They have also suggested the use of collaborative problem identification and solution rather than more traditional directive approaches (Likert, 1967). It has been argued that such an approach would lead to clearer and more realistic goals, increased intrinsic motivation, and higher performance.

An examination of these two very different approaches to influencing organizational behavior, survey feedback and control systems, suggests the possibility of combining the strongest features of each into a new hybrid, a feedback system. Such a system would be a control system in that it would collect information on organizational functioning on a

regular basis and channel data back to a network of individuals. It would reflect collaborative control and survey feedback approaches in that organizational process data would be collected as well as performance data. The data would be distributed to all work unit members (not just managers) and designed to be used for collaborative problem solving. As in survey feedback, acceptance of the data could be enhanced through participation in the design of the data collection and usage system.

Focus of the Study

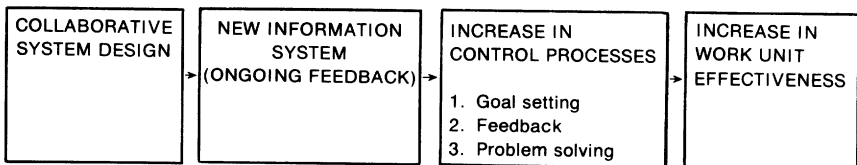
The study was designed to test the effects of designing and implementing an ongoing feedback system drawing on concepts of control systems, both traditional and collaborative, and survey feedback interventions. It was hypothesized (see Figure 1) that collaborative design activities would lead to the development of a new information system which would in turn lead to the development of control processes (goal setting, feedback, and problem solving) that would result in more effective patterns of behavior and higher levels of performance in work units.

METHOD

The Site

The study was conducted in 20 retail branches of a medium-sized bank in a Midwestern city. It involved designing a feedback system and implementing it in 10 of the 20 retail branches. Those 20 branches were relatively independent organizational units involved in retail banking operations. Each had a staff of between 8 and 25 people including tellers, financial consultants (desk personnel), supervisors, and managers. The majority of the individuals in each branch were tellers who performed service functions such as cashing checks, processing deposits

Figure 1. Hypothesized Effects of Ongoing Feedback System



and withdrawals, accepting loan payments, and performing special services such as selling travelers checks and providing access to safe deposit boxes. The financial consultants dealt with special customer problems, made loans, and concentrated on business development and community relations. Teller supervisors had responsibility for the teller group including teller training, scheduling, and balancing (making sure that all of the accounts balanced at the end of the day). Managers and assistant managers (in the larger branches) had overall responsibility for the branches.

Prior to this study, the bank had a traditional managerial information and control system. The vice president for retail services received detailed information about financial transactions and branch profitability. He used this information to formulate policy and evaluate branch managers' performance. The branch managers received financial, lending, and teller balancing information for their branches. This information was not routinely distributed to tellers and financial consultants who were rarely involved in critical decisions.

The Design of a New Control System

The study began when the authors approached the vice president in charge of the bank's retail branches with a proposal for an experiment testing a new feedback system. After discussing and reviewing the proposal, he tentatively authorized the bank's participation subject to approval by the managers of the retail branches. In their monthly staff meeting, the managers agreed as a group to participate in the study.

The proposal called for employee participation in system design and implementation. To accomplish this, a diagonal slice task force was created (drawing its logic and design from Zand, 1974; Alderfer, 1977). The task force included two branch managers, one assistant manager, one financial consultant, two teller supervisors, two tellers, the three researchers (the authors), and a representative of the vice president.

The task force met regularly for a period of approximately 3 months. The group decided that each branch should receive financial and productivity data, as well as personnel-related information and the results from a monthly attitude survey of branch personnel. The performance indicators selected included measures of teller performance (e.g., balancing accuracy, number and dollar volume of bad checks), loan performance (e.g., installment loan incomes, percentage of delinquent loans), and overall branch performance (e.g., profitability as a percentage of budget). The measures of the human organization included teller training (e.g., the number of specific tasks tellers in the branch were qualified to perform), employee commitment to the branch (e.g., absenteeism and turnover), and survey data on employee attitudes

and perceptions. All data were to be reported in aggregated form, reflecting work group or branch level activity.

Finally, the task force decided that the feedback system information would be distributed monthly, and that it would be sent to each branch manager for distribution to branch employees. The monthly cycle was chosen to be consistent with other information cycles and monthly branch meetings.

Implementation of the New Control System

The new control system was implemented in four stages. The first stage was the creation of the task force itself while the second stage involved meetings in each of the experimental branches to introduce the new control system. Meetings were run by task force members from the branches, who explained the way the new system had been developed, its purpose, and the next steps in its implementation.

The third stage involved a training session (6 hours long) run by the researchers to familiarize the managers and supervisors in the experimental branches with the nature of the new system and the ways it could be used effectively. The training session included a detailed explanation of the information contained in the monthly feedback report and a role-playing session with video tape as a tool to rehearse data use.

In the training session, the managers and supervisors were encouraged to review the data as a "management team" and to meet with all branch employees on a regular basis so that the data would be worked with in both peer groups and hierarchical settings (Mohrman, Mohrman, Cooke & Duncan, 1977). The managers and supervisors were also assured that new information contained in the feedback reports would not be used to evaluate their performance by the vice president. This was done in order to reduce the likelihood that they would try to "beat the system" by falsifying the data or pressuring employees to show short-term performance gains, a result that Cammann (1976), Hofstede (1967), Hopwood (1973), and Jasinski (1956) have noted when organizational rewards are contingent on control system performance.

The fourth stage involved setting up the data collection and processing systems and having the feedback reports prepared and sent to the branches each month.

Measures

A quasi-experimental nonequivalent (matched) comparison group design was used to assess the effects of the feedback system. The system was introduced into 10 branches of the bank, while 10 similar branches (matched on location, staff size, and profitability) were used to form a comparison group. Data were collected to assess behavior patterns and

work unit performance in these 20 branches, both before the control system was implemented and after it had been in operation for one year. In addition, observations and interviews were conducted over the course of the experimental year to gather information about the effect the new system had on the employees in the experimental branches.

Questionnaire

A questionnaire was developed and distributed to all employees, supervisors, and managers 2 months before the control system was implemented and 14 months later. The response rates were approximately 90% each time.

The questionnaire included multiple item scales in four different areas: branch control processes, employee participation in decision making, employee job perceptions, and branch outcomes. The scales, sample items, and estimated scale reliabilities are all shown in Table 1.

In addition to the questionnaire measures, people in the experimental branches were asked a separate set of questions in the second survey, designed to measure the different patterns of using the system information that emerged in each branch. Two scales were constructed: the Quality of Use Scale and the Frequency of Meetings Scale. The first of these scales included eight items assessing the support given the system by branch managers, the clarity of information presented at feedback meetings, the use of the system for goal setting, and the involvement of employees in feedback discussion. These items were based on factors of feedback usage identified by Klein, Kraut, and Wolfson (1971). The second scale included three questions asking how frequently branch meetings were held to discuss control system feedback.

Organizational Records

Data were collected from branch records to assess branch effectiveness and were used to develop outcome measures by averaging the record measures over a 3-month period. The pre-experimental measures covered the last 3 months of the experimental period. The following seven measures were collected from record data, five reflecting outcomes primarily related to the teller groups and two primarily to the financial consultants:

1. Teller Balancing Efficiency,
2. Volume of Bad Checks,
3. Absenteeism Rates (primarily teller absenteeism),
4. Turnover Rates (primarily teller turnover),
5. Teller Skill Levels (number of different functions the tellers in the branch were trained to perform),
6. Loan Income,
7. Loan Delinquency.

Table 1. Questionnaire Scales

<i>Scale</i>	<i>Sample Item from Scale</i>	<i>Number of Items in Scale</i>	<i>Scale Relia- bility*</i>
1. Supervisory Control Processes	My supervisor makes it clear how I should do my job.	13	.94
2. Group Control Processes	Each member of my work group has a clear idea of the group's goals.	7	.77
3. Participative Climate in the Branch	I feel free to tell people higher up what I really think.	9	.83
4. Employee Influence	How much say or influence do employees have on what goes on in your part of the organization?	1	---
5. Supervisor's Participative Style	My supervisor encourages subordinates to participate in important decisions.	3	.71
6. Autonomy	On my job I make a lot of decisions on my own.	2	.74
7. Goal Clarity	I always know what I should be doing on my job.	2	.58
8. Work Group Cohesiveness	I look forward to being with the members of my work group each day.	11	.83
9. Extrinsic Reward Contingency	How likely is it that you will get a bonus or a pay increase if you performed your job especially well?	3	.84
10. Effectiveness of Group Functioning	We have a very productive work group.	5	.65
11. Job Satisfaction	How satisfied are you with the chances you have to do the things you do best?	6	.89
12. Quality of Use	In the branch, the feedback system is used to set goals.	8	.90
13. Frequency of Meetings	How many meetings are usually held each month for working with the feedback?	3	.59

*Coefficient Alpha

While most of the measures were collected at the individual level, they were aggregated to develop measures for teller and financial consultant work groups in each branch, since the experimental treatment was at the group level.

Analysis

Ideally the effects of the new control system would be examined using a simple posttest-only analysis of variance (ANOVA) design. There were, however, a number of reasons why this simple procedure could not be used. First, there was no random assignment of branches to experimental or control conditions; even though the experimental and

control groups were matched in size and type of market served, differences could be expected in their initial states. Analyses were therefore based, wherever possible, on the changes that occurred during the experimental period, rather than on the condition in the branches at the end of it. To keep factors such as regression to the mean from influencing the results, the change scores were calculated by regressing the Time 2 scores and taking the residuals. The analyses were based on these residual change scores, and tests of experimental effects were made by examining the significance of the difference between the changes that occurred in the experimental branches and the changes in the comparison branches (relevant discussions of change measurement problems are in Harris, 1967; Cronbach & Furby, 1970).

Second, the simple ANOVA approach to studying the results was based on the hypothesis that the feedback system would have a relatively consistent effect on attitudes and behavior in all of the experimental branches. It seemed possible, however, that this would not be the case. While the technical design of the new system was the same for all the branches, there was no guarantee that the use of the system was the same for all the branches, there was no guarantee that the use of the system would be similar. The 6-hour training session was adequate to familiarize managers with the design of the feedback and the mechanics of the system, but it was hardly sufficient to train them all to use feedback in the same way. Another possibility was that the introduction of the new system would indicate to the employees that they could be given more influence in decision making in the branches. Uses of the feedback inconsistent with this expectation could produce an experience of pseudo-participation and result in feelings of frustration, dissatisfaction, and reduced motivation. Negative consequences of this type in some branches could balance positive consequences in others where appropriate use was made of the system, and thus give the appearance of having no effect. To discover if this happened, two approaches were used. First, the interviews and observations were to provide some indication of the ways in which the system was being used and the nature of the employee responses. Second, the measures of feedback-system use collected in the experimental branches at Time 2 were correlated with the change measures in these branches. Differential effects in the high- and low-use branches could be expected to produce correlations between usage patterns and changes if different patterns of responses were produced.

The experimental design used here (Design 10 in Campbell and Stanley's 1963 terminology) does not fully rule out alternative explanations of results. The experiment occurred within an ongoing organization, and extraneous factors such as changes in the market condition

faced by specific branches, changes in the personnel in specific branches, or differential responses to the experimenters certainly have some effect on the results. Sufficient measures were not available to allow analysis of these factors so that they could be statistically controlled, and consequently, the results must be interpreted with care. However, by using data from observations and interviews during the experimental year, the researchers have tried to link the changes in the experimental branches to the introduction of the new system. It is hoped that this information will allow readers to judge for themselves the validity of the results and interpretations.

RESULTS

The description of the results of the experiment will proceed in two stages. The first describes the researchers' assessments of the system's effects based on the interview and observational data collected over the course of the experimental year. The second examines the analyses of the quantitative measures to test these assessments.

Observations

The first systematic information about the effects of the feedback system was collected by interviews 3 months after it was introduced. Interviews were conducted with managers and personnel in each of the experimental branches to find out how the system had been received and how well it was functioning. These interviews revealed that different branches had varying responses to the new system. In one branch, for example, the employees did not even know the feedback system had been implemented because the branch manager had been putting the feedback reports in his desk drawer; in another, the manager had held training meetings to discuss the measures and had followed up by holding weekly meetings with the teller and financial consultant groups to examine the data, solve problems, and set goals. Between these extremes, different approaches to using the system were reflected in branches where the feedback information was posted but seldom discussed in formal meetings, and branches where the information was discussed in groups but few attempts were made to find solutions to the problems that emerged.

In addition, branch managers and supervisors appeared to have differing degrees of success in stimulating employee participation in control processes. The managers and supervisors reported that employees were hesitant to discuss the information in meetings or to make suggestions for changes. In some cases, they were able to draw the employees into the discussions; in others, however, the employees never became involved.

The patterns for using the new control system appeared to develop differently within the teller and financial consultant groups. While their meetings with tellers were relatively formal, most of the managers developed an informal pattern of using feedback system information with financial consultants. Oftentimes, they reviewed the feedback results individually with the financial consultants at rest periods during work.

The initial interviews conducted by the researchers stimulated managers in some branches. In one case, the management team started holding regular meetings to discuss the feedback and solve problems. In another, the assistant branch manager, who had responsibility for running the feedback system in the branch, came to the researchers and asked for help in figuring out how to build participation in the branch. The manager who had been putting the feedback in his desk drawer began to post the information in his branch, and the teller supervisor in the branch began to hold feedback meetings.

Over the next 6 months, most of the branches appeared to develop relatively stable patterns for using the system. The feedback was regularly distributed to employees in all the branches, and in most, there was some discussion of the results. Variations remained, however, in the frequency of meetings, the people who led discussions, and the extent to which employees actually got involved in problem solving and goal setting.

By the end of the experiment, the researchers had developed the hypothesis that the feedback system was producing positive results in some branches and negative results in others. This was particularly striking among the teller groups. Some of the teller groups had become actively involved in using the feedback system information to exercise control over their work. In one branch, for example, the tellers decided to try to increase the percentage of regular as opposed to budget checking accounts that were opened and in 2 months the ratio of regular to budget accounts changed from 1:2 to 2:1. In other branches, the tellers and their supervisors agreed to try to upgrade teller skill levels, and more tellers learned to perform tasks that had to be done in the branches.

In the teller groups where the system was not used regularly, the results appeared to be quite different. The tellers felt that the feedback system was another organizational change imposed on them, and it seemed to be more burdensome than helpful. In at least one case, the teller group began meetings to discuss the system feedback, and in the process, began to question some decisions that were made by their supervisor. The supervisor thought this was undermining her position and authority, so she stopped holding the meetings, leaving the tellers

angry, confused, and frustrated.

The effects of the feedback system on the financial consultants were less clear. It appeared that the system continued to be used informally and that the feedback information was not clearly differentiated from other sources of information. The information appeared to be used as a stimulus for problem solving, but most of the decisions were made by the branch managers with the financial consultants left to carry them out. The overall impact of the new system appeared to be positive, but not particularly strong, and in general, the financial consultants did not appear to perceive much change in their managers' behavior as a result of the experimental system.

Questionnaire and Archival Data

The first set of analyses examined the effects of the new control system on the teller groups. Table 2 shows the mean changes in control processes, participation levels, and outcomes for the experimental and comparison groups, as well as the probability that the differences in residualized change scores for these groups could be due to chance. Table 3 shows the correlation between the use measures in the experimental branches and the resulting changes.

The results in Table 2 indicate that there were no significant differences in changes of the mean levels for control processes, participation levels, and outcomes between the two groups of branches. The new control system clearly did not have general positive effects on the experimental group. It did not increase the levels of control, the extent of participation, or the levels of outcomes.

Table 3 shows the relationships between the measures of the use of the feedback system and the changes that occurred in the branches. These correlations indicate that the use of the new system was strongly related to changes in perceptions of group control, participative climate, intrinsic satisfaction, and group effectiveness. The use measures are moderately related to changes in supervisory control, perceived levels of contingent reward allocation, and dollar value of bad checks cashed. These results seem to indicate that high use of the feedback system appeared to produce significant direct increases in teller perception of group control, group effectiveness, participative climate, and intrinsic satisfaction. It also seemed to produce less significant, perhaps indirect, increases in supervisory control, contingent reward allocation, goal clarity, and teller skill levels, as well as decreases in the dollar values of bad checks and in turnover rates. Conversely, the sizes of the correlations and the small changes in the mean levels of these variables indicate that low use of the control system seemed to result in opposite (and negative) effects.

Table 2. Effects of the New Control Systems in Teller and Financial Consultant Groups

	TELLERS			FINANCIAL CONSULTANTS		
	<u>Comparison Branches</u>		<i>p</i> *	<u>Comparison Branches</u>		<i>p</i> *
	T1**	T2**		T1**	T2**	
Supervisory Control	4.73	4.66	.62	4.97	4.58	.10
Group Control	4.90	4.90	.89	5.20	4.91	.15
Participative Climate	4.66	4.51	.38	4.43	4.32	.07
Supervisor's Participative Style	4.78	4.39	.66	4.41	4.39	.73
Experienced Autonomy	4.07	3.92	.85	4.00	3.86	.88
Extrinsic Contingencies	3.78	3.42	.51	3.54	3.57	.04
Goal Clarity	5.28	5.31	.06	5.45	5.00	.05
Intrinsic Satisfaction	4.76	4.66	.80	4.62	4.62	.48
Group Effectiveness	4.86	4.87	.61	5.05	5.00	.18
Balancing Efficiency	.74	.82	.18	.68	.75	---
Bad Checks	149	331	.21	212	273	---
Skill Level	34	40	.63	39	43	---
Absence Rates	.010	.031	.92	.009	.127	---
Turnover Rates	.048	.035	.71	.053	.039	---
Installment Loan Income	---	---	---	---	---	---
Delinquency Rates	---	---	---	---	---	---
				\$42,156	\$34,331	.02
				.036	.046	.64
						\$39,952
						\$44,888
						.041
						.053

*Probability that differences in the changes in the experimental and comparison groups occurred by chance.
 **T1 and T2 means are presented to demonstrate the nature and direction of changes; the significance tests, however, are based on the residualized change score measures which control for regression effects.

Table 3. Relationships Between the Measures of Managerial Use of the Experimental Control System and Changes in Control Processes and Outcomes in the Experimental Branches

TELLERS (n = 10)

	<i>Quality of Use</i>	<i>Meeting Frequency</i>
Supervisory Control	.46	.57
Group Control	.89*	.87*
Participative Climate	.83*	.77*
Supervisor's Participative Style	.10	.23
Experienced Autonomy	.16	.14
Extrinsic Contingencies	.55	.60
Goal Clarity	.43	.38
Intrinsic Satisfaction	.71*	.84*
Group Effectiveness	.81*	.80*
Balancing Efficiency	-.11	-.20
Bad Checks	-.41	-.56
Skill Level	.35	.31
Absence Rates	.19	.12
Turnover Rates	.05	.07

* $p < .05$ for all correlations greater than .63.

Table 4 represents an analysis that was done to examine whether the changes in attitudinal and behavioral variables were related to the changes in control processes as hypothesized. The table presents the correlations between changes (residuals) in control process and changes in other variables. The results suggest that changes in these two sets of variables are related.

Table 4. Correlations of Changes in Control Process with Changes in Outcomes for the Tellers in the Experimental Branches

	<i>Supervisory Control</i>	<i>Group Control</i>	<i>Participative Climate</i>	<i>Supervisory Participative Style</i>
Group Control	.55			
Participative Climate	.62	.81*		
Supervisor's Participative Style	.86*	.25	.46	
Autonomy	.39	.19	.42	.53
Extrinsic Contingencies	.49	.57	.54	.45
Goal Clarity	.44	.53	.65*	.51
Intrinsic Satisfaction	.59	.72*	.53	.23
Group Effectiveness	.54	.59	.68*	.16
Balancing Efficiency	.02	.11	.11	.29
Bad Checks	-.45	-.40	-.18	-.20
Skill Level	.19	.56	.44	.17
Absence Rates	.35	.20	.11	.32
Turnover Rates	-.46	-.10	-.44	-.69*

* $p < .05$ for all correlations greater than .63.

The mean comparisons for the financial consultant groups are also shown in Table 2. The results show that the performance and attitudes of the financial consultants in the experimental branches improved more than those in the comparison groups. This pattern held in the case of every measure, with the difference being significant for the changes in perceptions of extrinsic reward contingencies, and goal clarity, as well as for changes in installment loan income. The increases in supervisory control, group control, and participative climate approached significance. On the other hand, none of the correlations between the use measures and the change measures were significant, indicating no effects of different patterns of use among financial consultants. Similarly, there were no significant correlations between control processes and outcomes for these groups.

DISCUSSION

Overview of Results

In general, the observational and analytic results are consistent. Both sources of data indicate that the feedback system did not have the general positive effects that were hypothesized (see Figure 1), but that it did have positive effects on some work groups, particularly where the system was effectively implemented by managers.

For teller work groups, the system appeared to have mixed effects. In some branches, the feedback was regularly used to involve tellers in their own control through goal setting and problem solving. In these branches, the use of the system appeared to produce increases in supervisory control, particularly in group control and participation. Understanding of branch goals, satisfaction with work, perceptions of group effectiveness, and teller performance all seemed to improve as a result. In other branches the new feedback system was used poorly, if at all, and this appeared to result in perceptions of decreased control processes and more negative outcomes. Thus, the new system produced improvements in branches where the managers and supervisors were able to use it to involve tellers in control processes, and produced decrements in branches where tellers were not involved.

For the financial consultant groups, the results were somewhat different. The feedback system appeared to have a relatively consistent positive effect, producing moderate increases in supervisory control, group control, and participative climate, with significant increases in perceived goal clarity, extrinsic reward contingencies, and performance (loan income). The changes in outcomes, however, did not seem related to patterns of managerial use and changes in control processes.

Issues Raised by the Results

The results of the experiment raise a number of important questions and issues. The first major issue concerns the *factors which moderate the impact that a structural change will have* on patterns of behavior. The teller work group results indicate that the way in which the new control system was used affected the types of control processes and patterns of effectiveness which resulted from the feedback system. This finding underscores a view of organizations as both social and technical systems (Trist & Bamforth, 1951; Rice, 1958; Trist, Higgin, Murray & Pollock, 1963). Effective interventions in organizations need to address both elements, both the technical and social. The feedback system was a technical change; new information was generated, and new patterns of formal distribution were created. It was, however, the critical aspects of the social system, and in particular the patterns of managerial behavior vis-à-vis the existing work groups, which ultimately determined what kind of effect the technostructural change would create.

The results also support what has been suggested by the survey feedback and control literatures. Feedback, by itself, may have little effect or mixed effects; it is how the feedback is used for goal setting and problem solving that is critical (Nadler, 1977). Similarly, control systems in organizations can best be understood if one considers both the technical elements of the system and the patterns of usage of the system by managers (Ansari, 1976; Cammann & Nadler, 1976). The current study supports these hypothesized relationships.

If patterns of usage of the system are critical, then it is important to understand why different patterns of usage emerged. The interviews and observations made during the course of the experiment suggest that two factors were important determinants of usage by managers. First, usage seems affected by the nature of organizational norms, rewards, and structures. The new feedback system was set up as separate from the other control and information systems (the vice president running the branches was asked to keep "hands off") and therefore, the system stood outside of the normal structure and was not tied to the salient rewards available in the organization. Thus, few extrinsic rewards were tied to system use; individual managers were not motivated externally to make best use of the system (consistent with observations of Todd, 1977; Lawler & Rhode, 1976). In short, no one in the branches believed that they would get a promotion or a raise because they used the feedback system well; conversely, no one thought that they would lose out on important rewards for not using the system.

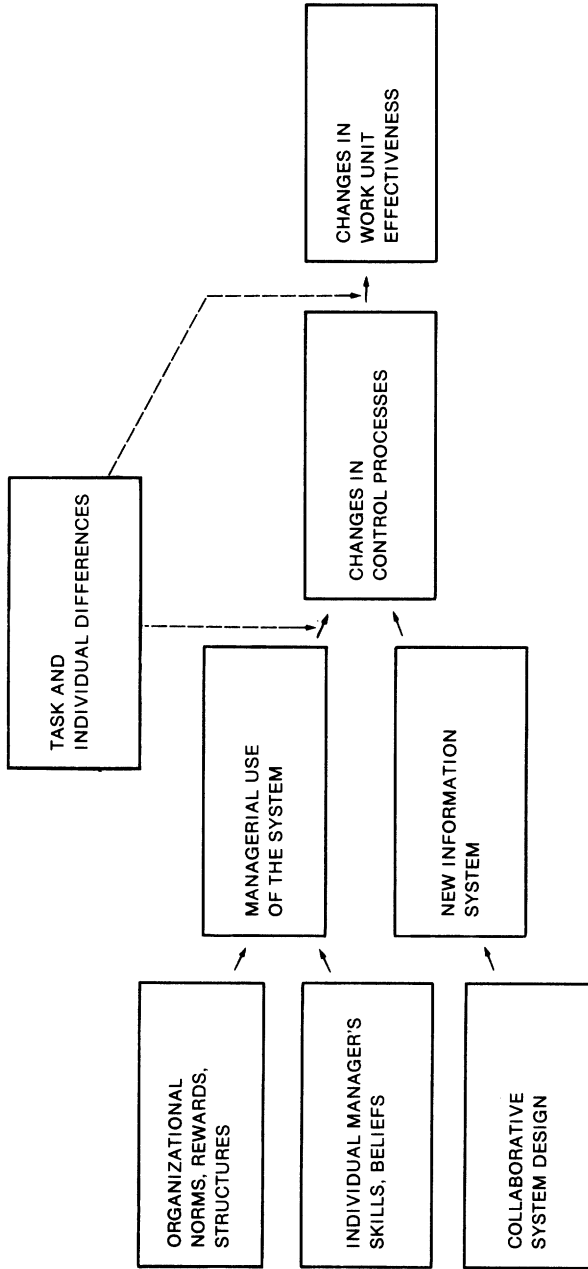
Second, usage seemed to be affected by the differences in the beliefs and skill levels of managers. Managers who used the system appeared to be those who had different models of organization guiding their

actions (see Argyris & Schön, 1974). They saw improvement in the functioning of the human system of a bank branch as leading to branch performance. Other managers, however, felt that the best thing they could do to improve a branch's performance was to be first class loan salesmen or marketers. They saw little use in holding meetings or looking at attitude data. Differences in models of action therefore led to different approaches to using feedback. While managers' beliefs were important, so were managers' skills. Some managers who wanted to use the system simply did not have the interpersonal skills required to help a group use feedback data effectively.

A second major issue concerns the potential *moderating effects of task and individual differences*. The difference in the pattern of results for the teller and financial consultant work groups suggests that different approaches for using information in general, and feedback specifically, may be called for where work units face different types of tasks or are made up of different kinds of members. The financial consultants worked in a fairly autonomous and self-controlling manner already: They had clear goals, and they saw their performance as related to rewards. When given new information about how they performed as a group, it was possible for them to find meaning in it and use it even where branch managers did little but post or circulate the data. One would suspect that in Locke's (1968) terms, such groups could do "covert goal setting" or develop their own goals over time, and then get rewarded by the existing organizational structures for meeting those goals. The tellers, on the other hand, had little control over their work and saw little connection between their own performance and rewards. Their orientation towards the bank as an organization was different, reflecting differences in individual career goals as well as differences in career paths available to them. Thus, feedback data by itself might have little meaning, and little external motivation would be created for individual tellers to set goals when higher performance was not rewarded. Tellers also had very little autonomy concerning how the work might get done. In Todd's (1977) terms, the new control system, where not used well, did not enhance either self-control or the performance-reward linkage, and therefore provided little incentive to use the data to improve performance.

In general, the data suggest a revised model of the effects of the development and design of the feedback system (see Figure 2). As before, collaborative design leads to the creation of a new information system. A new variable, managerial use, affected by organizational and individual factors, is seen as an important determinant of changes in control processes. Control processes, in turn, lead to changes in work unit effectiveness. The use-control process-effectiveness relationships,

Figure 2. Effects of an Ongoing Feedback System (Revised)



however, are moderated by task and individual differences in the work units receiving information.

Summary

The results of the study and the issues raised by this experiment provide some direction for future research and practice. The experience of implementing a structural change such as the feedback system sheds some light on the interdependence between technostructural and social system changes. While interventions aimed primarily at the social system (i.e., process-oriented change have been criticized for failure to bring about lasting and durable effects, see the review in Porter, Lawler & Hackman, 1975), the current study indicates that structural interventions, while potent and durable, may bring about changes that are unintended or unanticipated. Structural interventions do tend to lead to major and significant changes in patterns of behavior in organizations, but without attention to social system or process variables, such changes may be other than those desired. Effective interventions need to include both technostructural and social system components.

Finally, the study provides some insight into some of the dilemmas of action research. The decision of the researchers for example, to ask the vice president to keep "hands off" the system had some import on the results of the experiment. To the extent that action researchers attempt to modify patterns of organizational behavior for purposes of an experiment, they may undermine the validity of some of their own results. On the other hand, it is when such risks are taken that some of the most intriguing findings come about. In this case, because the vice president did not set a feedback policy or tie rewards to feedback usage, great variance in use of the feedback data came about. It is this variance, however, that probably led the researchers to the most significant learnings, about the effects of managerial usage and the interplay of social and technical change. This underscores the need to use multiple methods of data collection to pay attention to the various aspects of organization that researchers may touch as they attempt to do action research in real settings.

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Among democratic nations men easily attain a certain equality of conditions: they can never attain the equality they desire. It perpetually retires from before them, yet without hiding itself from their sight, and in retiring draws them on. At every moment they think they are about to grasp it; it escapes at every moment from their hold. They are near enough to see its charms, but too far off to enjoy them; and before they have fully tasted its delights, they die.

ALEX de TOCQUEVILLE
Democracy in America, 1835