Self-Design for High Involvement: A Large-Scale Organizational Change

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ABSTRACT

We present a case study of a five-year action research project in a twelve-plant division of a multi-billion dollar firm. The division is attempting to design new plants and redesign all established plants as high involvement, high performance work systems (Lawler, 1986). The design process is based on a self-design learning model (Mohrman & Cummings, 1989). The history of the change process and data about its effects are reported. We review in detail how the self-design learning system is shaped by the nature of change in a large, multi-level, multi-site organization. We also consider the unusual role of the action researcher in large-scale change.

KEY WORDS: Action Research, Large-Scale Change, Self-Design, Employee Involvement

The need for large-scale, strategically-driven change in complex organizations is increasing as these systems encounter increasing competition, changing markets, and advancing technologies. The action research literature is not very informative about organizational changes of this magnitude. Nearly all action research reports examine change projects in single organizational units such as departments or plants (for example, Rice, 1958; Clark, Hooper, & Gram, 1962; Marrow, Bowers, & Seashore, 1967; Pasmore & Friedlander, 1982; Macy, Peterson, & Norton, 1989). There are very few systematic treatments of action research in larger organizational units. This paper helps fill this relative void by examining an ongoing, five-year action research project in a twelve-plant manufacturing division of a multi-billion dollar food products firm. Division managers are attempting to make fundamental changes in the culture and organization design of the division.

The authors are part of a team of action researchers from the Center for Effective Organizations at the University of Southern California who have worked with the division for several years. They have provided consulting and research assistance on change strategy, on specific interventions undertaken by various plants, and on an overall strategy for organizational learning. This paper will provide an overview of the change effort, will examine the learning process that has evolved in the division, and will consider the special role of the action researcher in large-scale change.

CONCEPTUAL BACKGROUND

This change effort considered in this paper is taking place in a division-level unit of "Consumer Products Inc." (a pseudonym). Key managers have established a goal of transforming the division into a set of "high performance work systems." In their vision, high performance is achieved through the implementation of high involvement management practices. Three concepts are essential to understanding the case: high involvement management, large-scale organizational change, and self-design.

High Involvement Management

High involvement management (Lawler, 1986) is the extension of decision-making power, business information, rewards for performance, and technical and social skills to the lowest levels of the organization. Each of these four elements of the definition is integral to high involvement and its link

to high organizational performance. Without power to make decisions, employee participation is superficial. Adequate information about the business and other relevant matters, as well as technical and social skills, are needed for effective participation. Rewards for performance align employee motivation with long-term organizational objectives.

High involvement is a property of organizational systems, not solely of individual organizational members (Ledford, in press). It is reflected in the way the organization is structured and managed, not simply in the perceptions, attitudes, and beliefs of employees. Specific organization design features vary across different high involvement organizations, but all adopt a variety of design elements and practices in order to create and reinforce high levels of involvement. These design features typically include organizational structures and job designs (e.g., work teams) that move decision-making power down into the organization, pay systems which link rewards with business performance, management information systems which deliver business information, and training to build skills. Human resource practices must embody the common fate of all employees tied to the success of the business (e.g., all-salaried work force, gainsharing) and must facilitate the realization of employee involvement (e.g. selection of growth oriented individuals, bottoms up appraisal processes, skill-based pay).

Different authors use various terms to characterize organizations that use a broad array of such practices. We term organizations that adopt such practices "high involvement organizations" rather than "high performance organizations" (e.g., Hanna, 1988) or "high commitment organizations" (e.g., Walton, 1985). High involvement is a more descriptive and less loaded term. High performance and high employee commitment are not always achieved in organizations that are designed for high involvement. High involvement may not lead to desirable outcomes if environmental conditions or organizational conditions are unfavorable or if the high involvement design is poorly implemented (Lawler, 1986).

Large-Scale Organizational Change

The transition from an organization design based on the tenets of bureaucratic theory and scientific management (hierarchical control and specialization) to a high involvement organization

design represents large-scale change. *Large-scale organizational change* is a change in the character of an organization that significantly alters its performance (Ledford, Mohrman, Mohrman, & Lawler, 1989). It is *deep* change, affecting the most fundamental aspects of an organization, in this case the assumptions that people hold and that are embedded in the organization design about authority, control, motivation, and effectiveness. It is *pervasive* change, extending throughout the organization and its many subunits; it alters all or most of the design features of the organization, including its various human resource subsystems.

Large-scale change is similar to the concept of organizational transformation, as defined by Porras and Silvers (1991). They describe it as "paradigmatic change" that helps the organization better fit or create future environments. Its essence is the creation and enactment of a new vision for the organization that entails radical change in the behaviors of organizational members. This is accomplished through the establishment of a learning organization that is capable of continuous self-diagnosis and change.

Mohrman et al. (1990) further indicate that the target of change is a *large, complex organization*. In this case, the target is a twelve-plant manufacturing division of a major corporation. Change in such an organization involves change at multiple, nested levels of analysis: individual plants and their subsystems, the division and its subsystems, and the larger corporation that includes the division. This adds another dimension of complexity and challenge to the change effort. Beer, Eisenstat, and Spector (1990) have discussed a similar change agenda, which they term corporate renewal. They make the case that corporate-level renewal occurs to the extent that individual organizational units are able to revitalize themselves. This raises the interesting question of the respective roles of the corporate and unit levels in motivating and enabling change to occur.

Self-Design

The *self-design* change strategy (Mohrman & Cummings, 1989; Cummings & Mohrman, 1987) provides a process road map for organizational change that addresses two major issues of large-scale change: the extreme amount of learning that is required, and the difficult relationship issues that arise

between nested levels of the organization that is changing. The division used a self-design change strategy to guide its change process.

In essence, self-design is a learning strategy that provides a model for understanding and guiding fundamental change in complex organizations (see Figure 1). The change process begins with the development of a foundation for change that includes: an educational component; clarification of the values that will guide the design process; and diagnosis of the current state of the organization using the values as a template. A design team, usually representing different levels and functions in the organization, generally is responsible for laying the foundation. This process helps guide the design team's activities and helps increase awareness and buy-in in the rest of the organization about the nature and direction of the change process. The educational component typically consists of readings, presentations, visits to other companies, and attendance at conferences. These activities develop theoretical understanding and exposure to concrete examples that broaden awareness of alternative ways of organizing. The value clarification segment may include the initiation of a values or visioning process in the organization. Alternatively, as in the case of Consumer Products, there may be an existing strategy and value statement that can guide the self-design process. Diagnostic activities may include interviews, focus groups, survey data, and benchmark performance data gathered to develop a sense of the gap between the current functioning of the organization and its values.

Changes are then designed and implemented in an iterative manner. Through time, organizational members involved in the process redesign more and more systems, and learn through the assessment process what changes and additions to its implementation and design features are required to achieve the espoused values. This strategy for change is appropriate in guiding large-scale change where all contingencies and relationships cannot be known in advance, and where organizations and their members are required to learn substantially new behavior patterns in order to support the desired change. The Consumer Products Inc. division clearly faced these conditions in designing high involvement practices.

Insert Figure 1 about here

Central to the self-design change strategy is the notion that organizational members are redesigning the organization. That is, the design is not being imposed by outside experts or reproduced in full from a model that exists elsewhere. Applied to a complex multi-level organization, self-design implies a minimal specification approach in which those at higher levels of the organization specify broad design parameters, leaving the more specific designing to be done by the members of the units that have to make the design work locally. In the case of Consumer Products, this meant that the division level set forth a very broad description of the high performance, high involvement work system strategy, and left the specific design activities to the local plant level. Within plants, the change strategy in most cases was to encourage different organizational units to redesign themselves within an umbrella of design parameters developed locally to fit with the general direction specified by the division. Thus the image is of nested design levels with designs becoming more specific at more micro levels of analysis.

Because the self-design strategy is a learning model, it is quite compatible with a participatory action research strategy (Whyte, 1989). Such a research strategy builds on Lewin's notion that the validity of research is enhanced when the people in a research setting are active participants in the research process (Lewin, 1951). Self-design is consistent with the major characteristics of such research. The problems it addresses are defined by the practitioners within the local context. They also plan and carry out the interventions designed to test their hypotheses by trying to effect change in their situation (Argyris & Schon, 1987). Participants are both subjects and co-researchers.

In the self-design process, there are natural data collection points during the diagnostic stage and during each implementation/assessment iteration. This change process provides the opportunity to research the solving of real-world problems, within a value framework provided by the system that is changing itself. The enactment of the self-design process generates local competence to learn and adapt through time.

Applying the concept of participatory action research to large-scale change presents two major challenges. The first has to do with the multiple levels of the organization. Unit level change occurs within the context of a change effort at a more encompassing systemic level. In our study, for example,

change in each plant occurs within the context of a division-wide change strategy. Thus, there are at least two system levels at which participants may expect to influence and define the change interventions and the changes to the design of the organization. The research process also must maintain this dual focus.

The second major challenge is to reconceptualize the role of the action researcher. In supporting self-design activities of the division, we play an on-going action research role. However, our role differs from that usually depicted in the action research literature. Typically, the image in the literature is of the action researcher as "co-experimenter," who shares power to design, measure, and interpret organizational experiments with the client, in contrast with unilateral experimenter control in "normal" science (Peters & Robinson, 1984). However, in a large-scale organizational change, the action researcher is unlikely to achieve the status even of co-experimenter. Preserving room for action researcher involvement would provide an unacceptable constraint on the scope of the change process. For example, close participant-observer activity is impossible because there are too many changes unfolding in too many locations for any one researcher or research team to be involved in all of them. Thus, we argue that the action researcher participating in a large-scale change will assume a different kind of role and rely to a large extent on more distant data than has been typical in action research projects that focus on a particular organizational unit. The nature of the action researcher's role, then, is a response to practical necessity. Later, we will consider our role in the case and will explore some of its implications for action and research in large-scale organizational change.

HISTORY

The change process unfolded in a manufacturing unit that currently is called Consumer Foods Division (CFD). CFD manufactures a variety of prepackaged food products that generated over $2 billion in 1990 sales. These products, which include Consumer Products' best-known and most profitable brand names, are marketed by two marketing divisions. CFD closely coordinates activities ranging from production schedules to capital investment with the marketing divisions.

Contrary to the common assertion that major organizational changes are motivated by the direct experience of a performance crisis, neither CFD nor Consumer Products as a whole experienced a crisis

during the period of study. On the contrary, both the division and the corporation experienced continual success in hotly competitive markets. Between 1985 and 1990, corporate financial performance steadily improved until the company was among the top performers in the U.S. By 1990, return on equity, after-tax return on capital, and return on sales all were exceptional by U.S. standards. Similarly, all product lines manufactured by CFD were strong performers. The company had the highest market share of any competitor in two product lines and was second in two others. In one of the latter product lines, an especially lucrative and important business for the company, Consumer Products' share rose by nearly one-fourth during the 1980s. This occurred at a time when the share of the company's archrival, the market leader, was declining.

Start of the Change Process

In 1985, the watershed year in the change process, the division included six large, aging plants. The plants were between fifteen and forty years old. All used continuous process technologies; all employed at least four hundred people; five of the six were organized by a national union. Although there were differences in the culture of different plants, the plant work systems and management styles were conventional and bureaucratic, and labor-management relations at the unionized plants generally were adversarial.

The company's success in the marketplace created the potential for a future shortage of production capacity. Division management began developing plans to invest heavily in new capacity. In order to help determine how best to invest the new capital, management created a "Year 2000 Task Force" to investigate the type of work systems that would be needed for the company to be competitive in the year 2000 and beyond.

The task force consisted of a management representative from each plant and a union representative, including the local president in two cases, from each of the five organized plants. With the help of a consultant suggested by the union, the group engaged in a comprehensive strategic analysis of the division's business. (The consultant was not affiliated with the authors of this paper.) The task force identified a number of strategic challenges facing the division and concluded that high involvement organization designs were a promising way to meet those challenges. The findings of the

task force sowed the seeds for the division's transition toward high involvement, high performance systems. The task force began the process of laying the foundation for self-design in the division.

Soon afterward, the division began to implement its first new, "greenfield" high involvement plant and its first conversion of part of an existing plant to a high involvement mode. The greenfield operation was a small beverage plant that was built in the same community as an established food plant. The next year, the established plant began to design a new facility within its boundaries, called "Food Plant II," as a high involvement system. The design was created in cooperation with the union and with the help of the consultant from the Year 2000 Task Force. Both of these sites followed the self-design sequence. They established design teams that translated the values that had emerged from the Year 2000 Task Force into words that had local meaning. They education themselves, diagnosed the current reality, and developed criteria to guide their design activities.

Insert Figure 2 about here

Figure 2 reports major milestones in the change process in each plant in the division. During the first few years, the change effort was concentrated in the development of several new, "greenfield" plants that were designed from the beginning as high involvement systems, and in the conversions at Food Plant II and the only established non-union plant. Although division managers reiterated their intent to work cooperatively with the union in existing facilities, they opened new plants as non-union operations. This decision perhaps increased degrees of freedom in the new plants, but its effects in existing union plants probably were mixed. Initially, it increased union distrust of management's motives, but it also signalled management's determination to increase the use of high involvement designs in the division.

By 1991, four greenfield plants had begun production and a fifth was under construction. All embodied the ethic of self-design, and have used employee task teams to design key elements of the work system. This means that although the plants have many common design elements, there are also differences across plants. For example, skill-based pay was considered to be an important design element in three of the plants, but it was rejected as inapplicable in a fourth and important details of the

skill-based pay plans differed in two very similar beverage plants (Ledford & Bergel, 1991). All used self-directed work teams, few layers of management, extensive training and sharing of business information, and innovative selection processes. However, the particulars of these design elements varied from plant to plant.

Plant-level Activities in Established Plants

Although the biggest concentration of effort initially was in the start-ups, significant activity also began in two of the established plants. Food Plant II in one location was a high involvement facility within a conventionally-managed plant. The only established non-union plant also began planning for a new high involvement business within the facility when it received capital for a new product line. Management reconceptualized the plant as a collection of related, separate businesses, rather than one tightly integrated operation. Each separate business was able to design its own approaches within a values statement generated by a plant-level design team. This permitted differences in organization design (job design, pay systems, information systems, etc.) in different departments, and allowed employees in different departments to design their own work systems and to progress at their own pace toward high involvement.

Based on the experience at these plants, division managers decided that it was possible to convert existing facilities to a high involvement mode one piece at a time. They developed an explicit policy of building new capacity and making other capital investments only in facilities starting up all new lines as high involvement, high performance systems. Capacity began to be moved from plant to plant based on cost levels, which pressed local plants to find ways to make large gains in productivity. This contextual pressure was equally felt by local union leaders and plant management, who started to work together to protect jobs. Working with the same external consultant who had worked with the Year 2000 Task Force, several of the plants began laying a foundation for trust between union and management through a series of educational and problem-solving sessions.

In 1989-1990, continued general direction from division management combined with some staffing changes at the plant manger level gave new impetus to the transitions. In 1990, a top operations manager issued a document reviewing the key elements of a high involvement system and reiterating

division commitment. Building on the foundation that had been carefully built with their unions, several traditional plants had small but significant pilots in place by early 1991. These were plant subsystems (packaging lines, material handling departments, or manufacturing lines) that were self-designed by their members and functioned with cross-training and self-managing teams. Some used additional innovations such as skill-based pay and selection systems based on realistic job previews.

By mid-1991, there was a large range in the degree of success in the established plants. One plant had changed very little, continuing its dubious status as a maverick in the division. Four unionized plants had invested heavily in the establishment of a cooperative union management climate and in the education of all employees about the business and problem solving and team skills. Four established plants (one of them non-union) had begun significant innovations in selected work systems.

Division-Level Activities

Figure 3 helps place plant-level events in a larger context. The figure displays key corporate and environmental events, key division events, and our key assessment activities.

Insert Figure 3 about here

The division's environment, including Consumer Products as a whole and the union that represented six plants in the CFD, was eventful but generally benign during the period of study. In 1987, division management began well-received efforts to educate key line and human resource managers from all plants, as well as managers of the marketing divisions and higher-level corporate executives, about high involvement management. We were involved in several such events. Two reorganizations of the division had surprisingly little direct effect on the change effort. The division was eliminated in 1989 and its operations were folded into the two marketing divisions. In 1991, the division was recreated and expanded to include support functions such as engineering and research and development that had previously reported elsewhere. The reorganizations had limited effects partly because the champions of the change effort maintained relevant executive positions and because higher-level corporate managers supported the change effort. The shuffling at the top thus did not change the nature of the demands on the plants.

A final environmental event was the adoption of a formal, detailed policy statement on "new work systems" by the union in 1991. The document, developed with the help of the union's consultant, included some of the most forthright expressions ever made by a U.S. union in support of high involvement, high performance work systems. The report also provided considerable practical advice for union locals about working with management on such efforts. The statement sent a clear signal to Consumer Products and other companies that top union leaders wanted to be partners in the development of the new work systems.

Within the division, a number of activities encouraged the development of high involvement systems. The change process became a regular topic at the quarterly meetings of plant managers and weekly conference calls and semiannual meetings of human resource managers. In keeping with the spirit of self-design, division managers specified broad goals and allowed the change strategy to emerge in each facility. In 1987-88, the company commissioned one of the authors to conduct a study of high involvement plants in the U.S. in order to create a benchmark of practices and to identify innovative plants that would be of interest to Consumer Products personnel. The results of this study contributed to learning and served as a resource (Ledford, Cummings, & Wright, 1991). At this time, the company hired a Director of Manufacturing (as well as other key managers in other divisions) from another firm that had installed a number of high performance systems. A public review of progress in 1989 served as a further spur to action, particularly in established plants where little redesign had occurred.

Our work with the division began in 1987. The first author was invited to work with the first greenfield plant in the division on the development of a skill-based pay plan. After the plan was designed, he collected baseline survey data from employees at the plant on a wide range of variables. The relationship between our research center and the division intensified by mid-year, and we began long-term action research efforts. We worked with a team from Consumer Products to design and conduct a survey of all plants in the system the following year. Each plant worked with us to develop an approach for feeding the data back to employees as a check on progress and a stimulus to further design efforts. The survey was repeated in 1990-91. Again, survey results were used locally to assess progress and to identify further design refinements.

Working with division management, we planned and conducted a systematic review of the new work systems in 1991. The review was intended to surface learnings that would be useful in planning additional changes by identifying what innovations existed and what impact they were having. We used the two waves of survey data, readily available performance data, and extensive new interview data. We conducted one- to two-hour interviews with 12 division managers, the plant manager and human resource manager for all twelve plants, and two outside consultants who had worked closely with several unionized plants. The interviews assessed the effectiveness of the change process and examined the nature of the division's learning processes. The findings from this assessment provided the foundation for a series of meetings to discuss progress, to recommit to the general direction, and to establish targets for the transition.

ASSESSMENT RESULTS: STATUS OF THE TRANSITION

The assessment indicated that the large-scale change effort had not yet succeeded in fundamentally changing the character of the division as a whole, but it was having discernable impact. A critical mass of start-ups and conversions appeared to be developing. Several types of data supported these conclusions.

Employee Survey Results

We conducted employee surveys in all plants in the division in 1988 (T1) and 1990-91 (T2). The questionnaires were administered by local plant management and mailed back to us for processing. Overall response rates were 53 percent (2152 respondents) at T1 and 54 percent (2405 respondents) at T2, with wide variations by plant. The surveys were wide-ranging, in keeping with their purposes; they assessed the use of high involvement practices, organization functioning, employee quality of work life, and employee perceptions of team and plant effectiveness. Tables 1 and 2 report representative results from each of several categories of measures that are directly relevant to the targets of change in the plants. These include quality of work life outcomes, information sharing, job design, supervisory style, team functioning, organizational processes, and employee influence in decision making. Details on the content and psychometric properties of the measures are available from the authors.

Because there were over 2000 respondents to each survey, virtually all reportable differences between T1 and T2 and most differences between major subsamples would be statistically significant at the individual level. However, the appropriate level of analysis for purposes here is the plant or unit level. Thus, the data reported in Table 1 and Table 2 are averages of aggregated plant-level responses, with one exception. The exception is one plant (designated as EST1 in Figure 2) in which three different subunits were managed in very different ways, including one plant-within-a-plant high involvement conversion. Each of these three subunits was aggregated separately at T1 and T2. Data are reported for all but two plants in the Division at T1, which were not included because response rates were unacceptably low (13 and 19 percent, respectively). Data are reported for all plants in the division at Time 2, with the exception of one small established plant (EST7) that declined to participate in the survey.

Table 1 reports results for a matched set of sites for which data are available at both Time 1 and Time 2. These sites are seven plants and subunits, including three large, established sites (EST 2, EST4, and EST5 in Figure 2), the plant (EST1) with the three subunits that were analyzed separately (including one high involvement conversion), and one greenfield high involvement plant (GF1). These plants and units collectively accounted for 74 percent of all manufacturing employees in the division at T2, thus providing a reasonable indication of trends for the division as a whole.

Insert Table 1 about here

The data indicate that the mean response changed in a positive direction on 18 of the 20 measures. No measure showed a negative change, and there was no difference in the mean response only two measures (task feedback and teamwork). Some measures showed a change that we regard as considerable. In the absence of generally accepted guidelines from the literature, we use our experience to define a considerable difference as a mean change of .3 or more on a 7-point scale. By this standard, job variety, supervisory participativeness, team participativeness, team consideration, and influence over planning and scheduling increased considerably. Because of the small sample of plants, statistical significance of these increases cannot be judged; however, the pattern reflects the kinds of changes that

plants implemented. Of equal interest are the areas that did not show major improvement. Job variety was the only job characteristic that showed improvement; supervisor consideration and production orientation, team production orientation and control over costs, team processes such as teamwork, innovation, and intergroup cooperation, influence over the work and quality, and attitudinal outcomes such as job satisfaction did not change or were marginally more favorable. The overall pattern reflects the fact that most plants, especially the established ones, worked on general changes intended to create a more participative climate, increasing skills, information sharing, and upgrading supervision, but not on work redesign.

Table 2 compares the results of the established plants versus high involvement plants at Time 2. The established plants are the two different conventionally-managed units from EST1 and plants EST2, EST3, EST4, EST5, and EST6. The high involvement plants are the converted plant-within-a-plant from EST1 and all greenfield sites (GF1, GF2, GF3, and GF4) that were in operation at T2.

Insert Table 2 about here

Attitudes in the division as a whole appeared to be slightly more favorable, as indicated in Table 1, but the high involvement plants demonstrated a clear advantage over the conventional plants on a number of dimensions. These include three of four job characteristics, all three supervisor style measures, three of four measures of team functioning, innovation, all three measures of influence, and trust in management. This reflects the more systematic use of innovative practices in the high involvement plants, especially changes in job design that increased self-management.

Our interviews indicated that there was a system-wide belief in the efficacy of a number of change technologies, including the reduction of management layers and staff, the use of rigorous selection systems for high involvement work areas, extensive training in technical, social and business skills, and extensive sharing of business information. Skill based pay was part of the start-ups and some of the conversions. None of the established facilities used gainsharing, in part because of discouragement from doing so by division management. Even in start-ups, the innovative work systems

rested primarily on changes in the social system; technical personnel were minimally involved in the design efforts, and technical redesign was not generally considered.

Performance Effects

Estimating the performance effects of the high involvement systems is difficult for several reasons. First, differences in product mix confound attempts to compare different plants. One product is made only in two start-ups; some but not all plants that manufacture the main food product of the division also manufacture other products; and several different technologies are used, sometimes in the same plant, to manufacture products within the same product line. Second, most of the high involvement systems are too immature (less than 18 months in operation) to test their effectiveness fairly. Third, several changes in performance measures have made it difficult to estimate improvements over time. We currently are working with division management to develop means of tracking the performance effects of high involvement systems that might overcome these problems in the future.

Available data are encouraging but somewhat mixed in suggesting that high involvement systems show a positive effect on plant performance. Especially encouraging is the performance of the start-ups. The high involvement systems have removed at least one layer of management, and some of these systems are extremely lean. Due to more flexible work rules and the incorporation of support functions such as material handling and minor maintenance into operator responsibilities, non-exempt staffing is considerably less (10 to 30 percent less, by internal estimates) than in conventional plants. Moreover, in three different start-up plants, there is only one line manager (the plant manager or production manager) per plant, and all three plants share only one human resource manager (who also has responsibilities for an established plant). Quality appears to be high in these plants; for example, a start-up plant produces the top quality in the division after less than a year of operation. Speed of new product introductions, an increasingly important measure, appears to be high in the high involvement systems. On the other hand, a careful internal study of costs, quality, and absenteeism in the most mature converted production line compared to similar production lines in sister plants found no overall advantage, and some performance deficits, in the converted system. More systematic study will be

conducted in the future to examine the range of performance variables used in the division in order to track performance impacts both in start-ups and conversions.

Overall, the survey, interview, and performance data indicate that considerable change has occurred in the division. At this point, almost one in five employees in the division works in a high involvement work system, and the number is increasing rapidly. So far, the data suggest that the movement toward such systems has been desirable both for employees and for the company as a whole, although the performance impact so far is somewhat ambiguous.

ASSESSMENT OF THE LEARNING SYSTEM

So far, we have reviewed the history of the transition within the division and we have examined the evidence indicating that a transition is in fact occurring. In this section, we will look at the division as a learning system in order to better understand the dynamics of self-design and large-scale change at the division level.

The Learning Task

Key division managers believe that high involvement work systems can be a source of competitive advantage for the division. They have set the goal of transforming all plants in the system to this mode of operation before the year 2000. A number of competitors have created pilot high involvement operations, but few are in a position to adopt new work systems so aggressively.

Whether the Consumer Foods Division can achieve a full transition quickly depends to a great extent on the effectiveness of its learning system. Large-scale change of this nature requires considerable learning at all levels and in all units of the organization. The rate of learning presumably can be enhanced through the establishment of a learning network that permits diffusion of ideas, practices, experiences, and knowledge. Large-scale change also depends on the unleashing of initiative throughout the system -- it cannot be closely controlled and managed from a central location.

The self-design change strategy theoretically addresses these needs by stressing the learning aspects of change and the establishment of an organizational umbrella for learning, while at the same time moving design activities and ownership into the work units themselves. This is a delicate balance. There is potential for conflict between the legitimate interests of the division in establishing direction

and energizing learning and of the plants in managing their own transitions. Our 1991 interviews were aimed in part at assessing the effectiveness of the learning processes in the division, and providing feedback that would help the division become a more effective learning system. We found a mixed picture that illustrates the tensions between levels and units in a complex organization.

Mechanisms for Learning

We were impressed by the wide range of learning practices that were used in the vast majority of plants. A primary mode was learning by establishing models of high involvement. The innovative start-up facilities became laboratories for learning about these innovative approaches. Several of the traditional plants learned from the establishment of pilot lines and departments. Experience with these various pilots became raw material for learning among all the plants.

Within plants, there was extensive use of off-sites for education and training, discussing and interpreting the information about high involvement work systems, and collective planning and designing. Several plants reported the effective use of external consultants to help them learn what is working in other companies, and to develop a way to think about the change. One plant manager reported that the external consultant was particularly helpful in enabling the group to continue probing possible approaches when its tendency was to say "it can't be done given our constraints."

Among the interviewees, there was a widespread belief that learning from other sites was desirable, and that more should occur. In fact, the levels of cross-site information sharing were impressive. Managers from almost all plants had visited high involvement plants both within and outside of Consumer Products. In several plants, union officials were part of the visits. For the unionized plants, visits to other unionized companies to see high involvement concepts working were particularly important in offsetting the prevailing notion that "these concepts can only work when there isn't a union."

There was a great deal of exchange of materials for selection, training and orientation between plants. Managers and union members from several plants attended educational events in other plants as a way of gaining early exposure and to help develop a shared commitment to proceed. A number of plant managers talked about using another plant's "blueprint" as a straw man in their own design team's

efforts. Exchange of visits and experiences was especially intense among the start-ups, where for a short period of time there was a support network of plant managers who met to share their experiences and learn from one another. They reported that because of their common interests they could share in-depth information that was very useful.

An extremely effective dissemination technique was the transfer of people from high involvement facilities to transitional plants. They brought with them an image of what is possible that in some cases was helpful in unfreezing established plants. In fact, the human resources manager from one established plant talked about being at a disadvantage because it did not have anyone on staff who had been part of a high involvement organization.

The human resource function assumed a major role in the transfer of information about high involvement practices throughout the division, for several reasons. Many high involvement practices (such as pay systems, training, and selection) were within the direct responsibility of the human resource function. Also, a key division-level human resource manager devoted considerable effort to sharing the practices of different plants through a variety of human resource information channels. Finally, the plant-level human resource managers as a group were very interested in and supportive of the change effort.

Following the initial flurry of division sponsored workshops to start to lay the foundation for the division-wide transition, the high involvement transition became a regular agenda item on weekly human resources manager conference calls and at quarterly plant manager meetings. These forums are still used for information sharing, but it is now much less formal. Most managers reported that they still find the meetings to be good opportunities for informal sharing.

Role of Division Management

Division management adhered to the concept of self-design and gave plants a great deal of latitude. They also set a goal for all plants to adopt the high involvement model most appropriate to local conditions. However, an umbrella of clear values and broad design parameters were not always formulated. There was, for example, no clear division-level statement of values or strategy that united the effort. Although all plant managers and human resource managers had heard the message that "all

plants will be high performance plants by the year 2000," it came in a mixed form. For example, some plants were told that the company would not support their transition unless they could be assured of a certain cost savings. This combination of messages left those plants feeling imperiled and disempowered. Even in some plants that were feeling very well supported in their transition efforts, plant management spoke about the division being more concerned about the performance levels than the management model. One plant manager said, "the real goal is cost per case, and they just assume that we'll do that by becoming a high performing work system. If we can achieve it some other way, it will be all right with them." Another manifestation of the same phenomenon was that the newest start-up plant was planning to begin operations as "more traditional" and gradually move to self-management because of the pressures they were feeling for early performance achievements.

Supporting this perception was a commonly held belief in the plants that the divisional departments had not embarked on a transition of their own -- in fact, that there had been no change in the way they did business. High involvement management seemed to be desirable for the plants, but not for the headquarters operations. In part, this discontinuity could exist because of the lack of an overarching set of values and objectives to drive the process. Division managers did not have to confront the inconsistencies between the way they did business and the values they were espousing.

The ambiguity of message had at least two important nuances. One had to do with a history of uneasy relations between union and management in some of the plants. This adversarial history internally often was accompanied by a somewhat adversarial set of relations between the plant and headquarters. In these plants, willingness to invest in the high involvement transition sometimes was clouded by a "show me" stance on the part of the division. Thus, the division was simultaneously advocating the transition and withholding support for it in subtle ways.

Interpretation of the Self-Design Model

The second important nuance of the ambiguity of the message that came from the division had to do with the concept of self-design itself. The self-design approach was almost universally accepted, and interviewees reported remarkably similar interpretations. They focused particularly on the image

of letting each unit design itself, and on the iterative nature of the change process. They also accepted the educational and diagnostic parts of the early foundation-laying stage of the self-design process.

The part of the self-design approach that was not well enacted was self-design at the division level to provide a context for plant transition. In part this was well-intended. Division managers saw themselves permitting plants to design an approach that was locally sensitive and over which the plants felt ownership. This resulted in the two symptoms that we encountered: ambiguity about the values driving the change, and slow movement in changing the way the division headquarters operated to be congruent with the general notions of high performance work systems that were being verbalized.

Division managers were supportive of the iterative, learning nature of the change process. In fact, more than other companies with which we are familiar, they supported thorough assessment and feedback processes, and engaged in the process of thinking through what had been learned and what needed to be done. However, they had difficulty seeing themselves as part of the target learning system. Some of them translated the assessment process into a traditional mode of plant assessment. Their inclination was to talk about how to get the plant managers moving faster, not what they in the division departments could do to be partners in the transition.

Use of the Self-Design Process at the Plant Level

The meaning of self-design within plants paralleled its meaning at the division level. There was a broad range in the extent to which a complete foundation was laid. In particular, plants varied in the extent to which they were explicit about their values. The design teams in the start-ups tended to be the most systematic in articulating the values underlying their design. For example, the management team in one of the start-ups met weekly and went off-site monthly to talk about progress, and to "ensure that we're all pointed in the same direction." Without that, according to the plant manager, there was a tendency for people to drift away from the espoused plant values. One of the traditional plants did an equally thorough job of articulating plant values, involving employees in the process of generating a plant value and vision statement. The off-sites with union leaders that occurred in four plants involved a great deal of discussion about values, formulation of shared goals, and articulation of shared interests.

In most plants, however, there was still a long way to go in involving the rank and file and creating a plant-wide shared vision of a new way of functioning.

Self-design provided a common approach to change in these established plants. As pilot areas were identified, a design team from within the area was identified and given responsibility for designing. It was unclear, however, whether an adequate plant-level umbrella had been provided for these very local design activities. In the absence of an effective self-design process at the plant level to tie all the activities together, the context for the pilot areas may not change adequately to nurture and sustain the high involvement model. Thus, it seemed that even at the plant level, the interpretation of self-design was skewed toward emphasis on the empowerment of the piece parts and less on the integrative glue to hold them together in a common direction.

Several plants reported that inadequate change resources were hampering their transition. In particular, they felt that they needed facilitative and design help from people with experience in high involvement systems. External consultants were helpful, but the plants felt that they needed expertise that was more readily available. It was a very big leap from reading about and visiting such systems to designing a change process and implementing new systems. This was especially true for plant managers who were enmeshed in day-to-day operations and heavily imbued in the logic of the system they managed.

Political Dynamics of the Learning Process

The notion of self-design as enacted in the division played into certain political dynamics. One of these dynamics concerned plant-headquarters relations, and the tension between plant desire for autonomy and division desire for control. This dynamic in our experience is an inevitable property of a complex organization with embedded system levels. Plants used the concept of self-design as a way of protecting their autonomy. In some ways, this concept freed them up to be much more open with one another because they had been assured that no one would shove a model down their throats. On the other hand, several plant managers were much more wary about sharing and used the concept of self-design to justify some isolation. One plant manager, for instance, said that "although the cards were still out in headquarters' minds about whether high involvement systems are truly more productive,

once they make up their minds there will for sure be an attempt to cookie-cutter us." Another plant manager saw the recent issuance by one of the division managers of a document reiterating the common components of high involvement systems as proof that the division was moving to a "cookie cutter."

The tension also existed between plants. Several interviewees made the point that although it might be nice to think of the division as a cooperative learning system, the truth is that the plants are in fundamental competition with one another. How well they do vis-a-vis one another determines who grows and prospers. One plant manager said that although he felt the obligation to share his learning for general citizenship reasons, he knew he did this at some peril.

Another manifestation of this between-plant competition was not entirely dysfunctional. Even the visitations and exchange of materials and approaches led to a great deal of effort to outdo one another. Plants reported on using each other's ideas but "making them better". In this case, the competitive dynamic overlaps completely with the notion of learning and improving in each iteration.

Yet another tension that existed within the population of plants was that between the start-up high involvement plants and the established plants. This delineation coincided with the union/non-union distinction. People within these two kinds of plants saw themselves as being in two completely different kinds of social systems, and to some degree "tuned out" the experiences of each other as being irrelevant to them. Thus, informal learning networks tended to be within each subset, and not to cut across. Managers in the new plants felt that the biggest problem facing the division was the inertia in the established plants. The established plants talked about the start-ups not being part of their "real world," and looked for signs that they were less effective. Visitors to these start-up plants tended to fixate on the problems that were openly discussed because of their commitment to openness. Part of this could have been avoided by a more systematic examination and sharing of what was really going on in these start-ups, as well as of the pilots in the traditional plants. The sharing process, although impressive, was mostly informal, and contributed to gaps in understanding.

Conditions Fostering Interplant Cooperation

Our comments have pointed to both the extent and the limits of cooperative learning between personnel from different plants in the division. We have identified some of the ways in which division

management encouraged cooperative interplant learning, such as the creation of forums for learning (such as conference calls and meetings), personnel transfer and promotion policies that expanded friendship networks across plant boundaries, and plant visits. We also have identified some limiting factors, including ambiguity about values guiding division-level management behavior, restricted interpretations of the self-design concept, and resource limitations. It would not be difficult for us to expand upon the limiting forces by pointing to social psychological forces that are always at work in large organizations, such as in-group/out-group dynamics, plant managers' rational incentives for limiting discourse, and the response of plant personnel to mixed messages from above.

Despite the limiting forces, however, we believe that the level of interplant learning in the division was exceptional compared to other companies with which we have worked. This case raises questions concerning why the level of cooperative interplant learning was so high, and what minimum conditions are necessary to foster such behavior. We suggest that two forces were particularly important in this case: external pressures for change and a set of shared beliefs about the change process.

In Consumer Products, the external pressures for change were *external* to the plants but, in large measure, *internal* to the corporation. Most discussions of large-scale organizational change emphasize the need for environmental forces such as performance deficits and unfavorable market conditions to create the motivation for change that overcomes the inertia of past practice. In contrast, all plants in Consumer Products were reasonably solid performers (despite performance variation among them), and market conditions were unusually favorable throughout the period of study. Division-level management rather than the outside world was the primary stimulus for change. Division-level managers gave clear messages that performance improvements were required and would be rewarded, and stressed the performance advantages of high involvement designs. These messages did not go unnoticed by plant personnel. Galbraith (1989) observed a similar pattern in General Electric, where Chief Executive Officer Jack Welch rather than the outside environment became the primary stimulus for change.

The combination of strong division-level pressures for performance improvement and a munificent external environment probably favored interplant cooperation. There was real competition between plants; for example, not all plants could receive new capital at all times. However, none of the plants faced a credible threat to survival during the period of study. Every plant in the division was able to sell every case of product it could produce throughout this time. Thus, it was possible to create a "win-win" outcome by sharing learning that increased the performance of all plants. An important theoretical issue is whether the combination of conditions we observed in this case is needed to encourage shared learning between organizational units.

A set of shared beliefs, or a rough paradigm (Mohrman & Lawler, 1985), also played a critical role in fostering interplant cooperation. There was considerable agreement about some basic principles. Managers from almost all plants shared basically similar notions of what constituted a high involvement organization, agreed that such an organization would lead to performance improvements, and agreed that a self-design process was the best way to create the change. Addressing the areas of ambiguity about the nature of the change and the self-design process that we have identified probably would have strengthened the common paradigm, but the degree of agreement was important. Moreover, managers from different plants shared beliefs about the desirability of interplant cooperation in the learning process. Beliefs about interplant cooperation were reinforced by division-level managers and were widely accepted. This was shown most clearly on several occasions when plant or division-level managers who violated norms consistent with these beliefs were subjected to informal social sanctions. This case, then, suggests the possibility that shared beliefs about the change as well as shared beliefs about interunit cooperation may be a necessary condition for interunit collaboration in the learning process.

Next Steps

At the time of the writing of this article, division and plant managers were determining future goals and directions. The competitive environment continues to heat up, and top corporate management has taken an active role in encouraging an escalation in the transition process. The 1991 assessment provided a juncture for division managers to recommit to the direction they had established. They now

are considering a variety of options to improve divisional learning capability and to speed up the pace of change.

ROLE OF ACTION RESEARCH AND ACTION RESEARCHERS IN LARGE-SCALE CHANGE

Our focus so far has been on large-scale change in a division-level organization that used an action research process. In this section, we focus on how large-scale change affects the nature of action research and the role of the action researcher.

The Pilot Experiment Model of Action Research

Many action researchers have advocated use of the field experiment. In particular, many action researchers have encouraged clients to adopt changes on an experimental basis before diffusing them system-wide. The advantage of the field experiment for researchers is greater quasi-experimental control. The expectation for action is that successes can be replicated widely and failures can be avoided in the larger system. Action research need not be conducted this way in large systems, but the field experiment is very common and it follows naturally from the action research orientation.

However, the field experiment model is severely limited as a guide to large-scale change in complex, multi-level systems. Our case illustrates some of the problems. Division managers want to obtain a competitive advantage from the new work systems. Such a large-scale organizational change entails risk and requires a leap of managerial faith. The division is still in the early stages of its conversion even after years of concentrated effort. To wait long enough for scientifically credible research evidence to accumulate in one or two experimental plants before acting on a division-wide basis may involve waiting so long as to eliminate the potential for competitive advantage. That is because many of the firm's key competitors are using a slow, methodical, experimental approach already.

Another problem with field "experiments" was identified by Walton (1975). He found a number of cases -- many of them action research classics -- in which successful work restructuring experiments failed to have any impact on the larger firms of which they were a part. Precisely because the pilots were so different from the larger systems, they were rejected as inapplicable and undesirable. Thus, the experimental approach often is an impediment to large-scale change rather than a means to

such change (Kahn, 1982; Lawler, 1989). When all subunits are changing, members of subunits have a stake in learning from the experience of other subunits. Our conclusion is that in changing multi-unit, multi-level organizations, it often is better to attempt changes throughout the entire system rather than in limited pilots. This may sacrifice some degree of research control in order to enhance the prospects for meaningful action.

Comparative Case Studies

Most action research reports are based on data from only one organization. Learning from single cases is very problematic (March, Sproull, & Tamuz, 1991). Action research in large, multi-unit systems can have a distinct advantage because it can afford opportunities for comparative case studies. In the twelve-plant division considered here, for example, a variety of comparative case analyses of different high involvement innovations and entire high involvement systems are possible. Cross-case analysis is better than single-case studies for understanding of the variety of forms the intervention can take, shedding light on implementation issues, and increasing confidence in the external validity of findings.

The advantage of comparative case studies should not be overstated. Data from a handful of cases still present difficulties due to small sample size. When complex interventions are installed in a variety of organizational units, the appropriate number of variables still exceeds the number of cases by a substantial margin. The advantage of comparative case studies thus is relative, not absolute.

Who is the Client in Large-Scale Change?

Our case analysis provides considerable evidence that it was desirable for us to work at the division level rather than strictly at the plant level in Consumer Products. By design, most of the high involvement change activity in the division occurs at the plant level. Yet, no single plant has much control over the direction of the division as a whole. System-wide learning is encouraged or discouraged, particular innovations are approved or blocked, and a supportive context is provided or not, at the division level. These issues could not have been addressed successfully at any other organizational level. Our experience in this case suggests a rule of thumb for action researchers: the

appropriate client is the social system at least one level of analysis higher than the level at which the key changes are to be enacted.

Role of the Action Researcher

Our role was somewhat different in this case than the usual action research role. As in other reported cases, we provided process and expert content assistance at the divisional level and in many of the plants. However, we believe that our most important contribution was in helping the division develop and enact its learning strategy, not in assisting with specific changes. This role was a response to the special challenges of assisting with large-scale change in a complex, multi-unit organization.

In large-scale change, action researchers must help develop a strategy for learning about loosely-coupled activities that occur in multiple locations. The very nature of large-scale change demands energizing a great deal of activity in order to overcome organizational inertia. Change activity can snowball quickly and can far exceed the capacity of action researchers to respond to it. Even a team of action researchers is unlikely to maintain a close relationship with all the various subsystems undergoing change. Furthermore, the larger and more complex the system, the more varied are the subsystems that are likely change targets, and the more unlikely it is that particular action researchers will have the experience and expertise to provide content and process assistance for all efforts.

In large-scale change, the action researcher focuses naturally on the creation of the learning community. This community is a complex network consisting of nested levels of design and multiple foci. It includes a variety of change resources both internal and external to the changing system, and involves the establishment of formal and informal structures and processes for learning.

A key challenge for the action researcher is to avoid getting caught on one side of the inherent tensions between various system levels. The plant/division tension can become a landmine if the client is not the entire division. Building the learning community involves bridging the gaps between subsystems and system levels, which is the essence of the creation of a high involvement system.

The action research role results in the creation of knowledge through a process somewhat different in emphasis from traditional action research, in which the researcher has been intimately connected with the changes that are studied. The process virtually requires the use of positivistic forms

of data such as employee surveys, performance data, and structured interviews. It relies less on the researchers' subjective experience of the change process. The action researcher in complex change has to rely heavily on the client system to develop a collective interpretation of the data and a shared vision of next steps. In fact, the key role of the researcher is to facilitate such a process.

CONCLUSION: SOME ISSUES FOR FUTURE RESEARCH

We have discussed in some depth a case of large-scale organizational change, and the self-design process that was used to create the change. This paper raises a number of issues that call for future research. These concern the nature of large-scale organizational change and the self-design process.

We have argued that change in large, nested, multi-level organizations is a qualitatively different phenomenon than change in single units, such as departments and plants. At this point, very few rich case descriptions of large-scale organizational change are available to confirm or disconfirm this assertion. Future research in other large, multi-level, multi-location organizations can investigate whether the learning dynamics we have documented are typical, and can explore means of resolving the dilemmas in managing the learning system that we have identified. Another interesting issue is whether the dynamics we have considered at the division level are different when the target of change is at higher levels of analysis, such as the entire multidivisional firm or sets of firms.

The self-design concept is widely and firmly embraced, for a variety of reasons, in the division studied here. Future case studies may help address the question of whether the self-design process or other forms of action research are helpful in developing change in other large, multi-level organizations. It is possible that the culture of Consumer Products is an unusual and especially fertile soil for action research. Thus the rarity of reported action research in large-scale organizational change may be the result of a shortage of organizations that are willing to engage in action research, a shortage of action researchers interested in the topic, or both.

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FIGURE 1
THE SELF-DESIGN STRATEGY

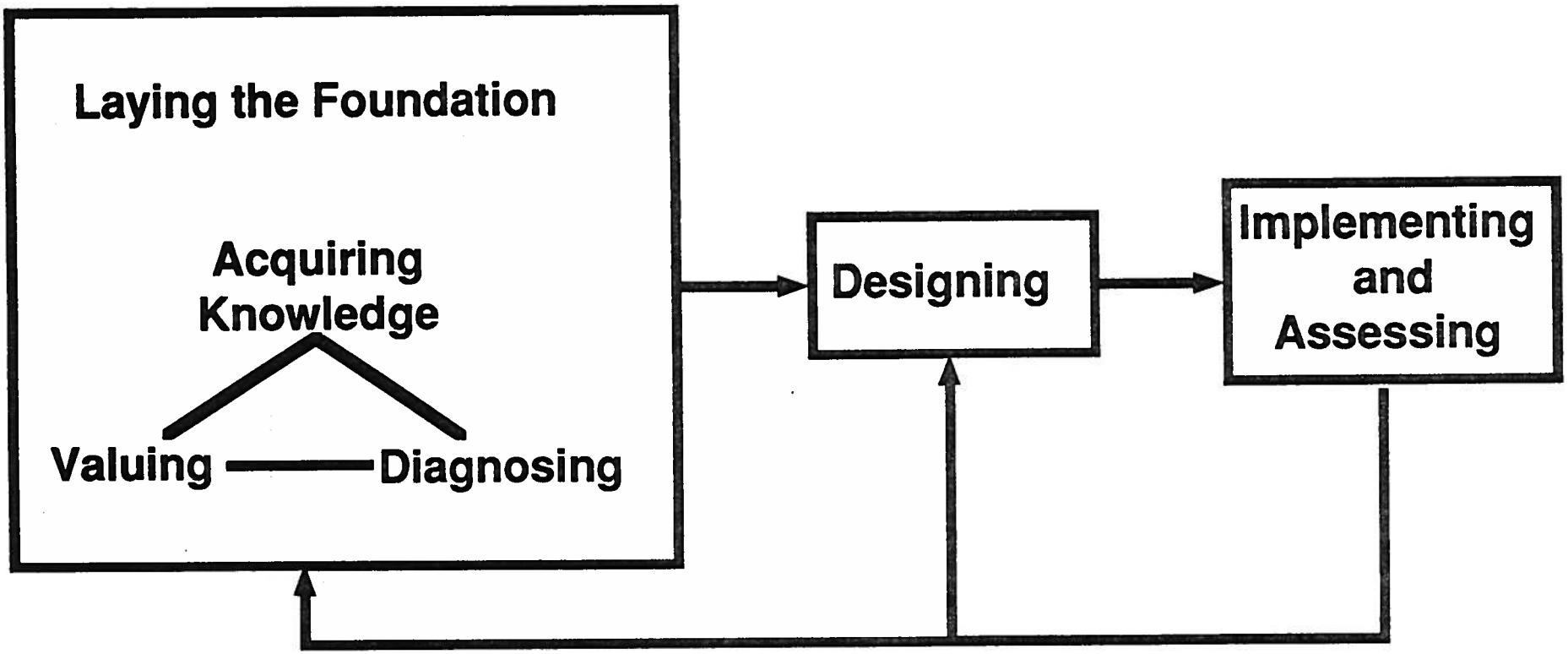

FIGURE 2
PLANT ACTIVITIES

	1985	1986	1987	1988	1989	1990	1991
GF1	Planning	Production Starts					
GF2			Planning	Production Starts			
GF3			Planning		Hiring, Training	Production Starts	
GF4				Planning	Production Starts		
GF5						Planning	Pre-Start-Up
EST1		Planning for new HPWS		Production Starts in HPWS	Expansion of HPWS		Review of HPWS
EST2*		Planning for new HPWS	Planning for Facility Redesign		Movement toward Business Line Structure	New HPWS Begins Production	
EST3				Union/Management Committee		2 Experimental HPWS	
EST4					Union/Management Committee		Business Line Structure
EST5						Planning for Re-design in 1 Area	Implementation of HPWS within Plant
EST6						Education Phase with Union	
EST7							

GF=New, "Greenfield" Plant **EST=Established Plant** *** (The only non-union traditional plant)** **HPWS=High Performance Work System**

FIGURE 3
KEY TRANSITION EVENTS

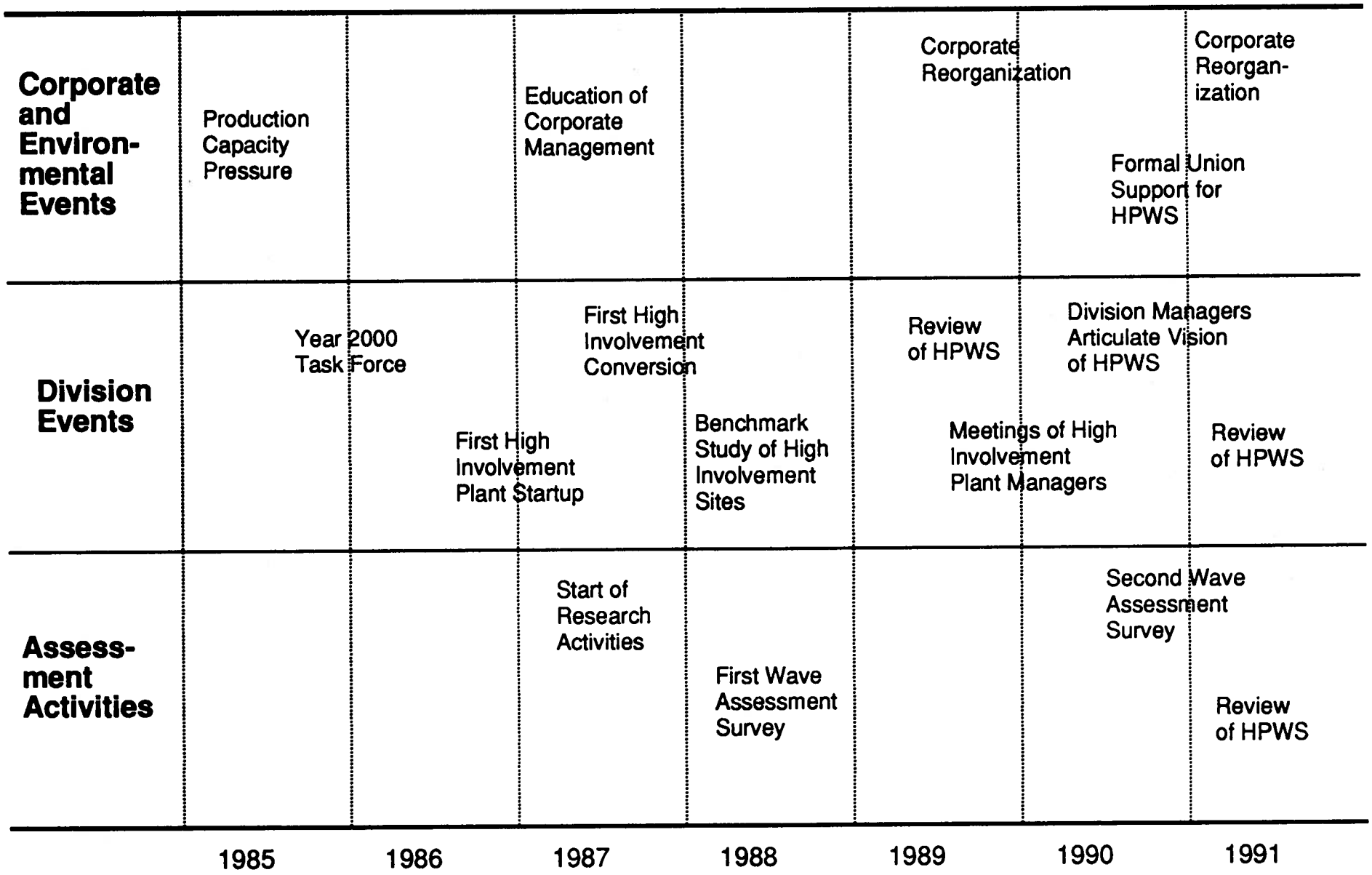

TABLE 1

ASSESSMENT SURVEY COMPARISONS

Plant Level Data: Matched Sample of Plants

	Time 1		Time 2	
Scale:	Mean	S.D.	Mean	S.D.
Job Satisfaction	5.4	1.1	5.6	1.2
Trust	3.7	1.0	3.9	1.4
Big Picture	5.4	0.9	5.6	1.0
Job Variety	4.8	1.3	5.3	1.3
Job Identity	4.5	1.3	4.7	1.5
Job Autonomy	5.3	1.1	5.5	1.2
Task Feedback	4.5	1.3	4.5	1.5
Supervisory Participativeness	4.1	1.4	4.4	1.6
Supervisory Consideration	4.2	1.5	4.4	1.7
Supervisory Prod. Orientation	4.7	1.3	4.8	1.5
Team Participativeness	4.4	1.3	4.7	1.5
Team Consideration	4.4	1.4	4.7	1.5
Team Production Orientation	4.5	1.3	4.6	1.5
Team Control of Costs	4.7	1.3	4.9	1.4
Teamwork	4.6	1.3	4.6	1.4
Innovation	4.8	1.0	5.0	1.3
Intergroup Cooperation	4.4	1.2	4.5	1.4
Influence over Way Work is Done	3.3	1.0	3.5	1.1
Influence over Planning & Sched.	2.7	1.2	3.0	1.3
Influence over Quality	3.4	1.0	3.5	1.0

NOTES:

1. T1=1988; N=9 plants and subunits (1998 respondents)
2. T2=1990-1991; N=12 plants and subunits (2405 respondents)
3. Repeated Plants; N=7 plants and subunits (1956 respondents at T1, 1539 respondents at T2)
4. All response scales are seven-point Likert scales except the influence measures, which are five-point scales.

TABLE 2

ASSESSMENT SURVEY COMPARISONS

Plant Level Data:
Established Plants versus High Involvement Plants

	Established Plants Time 2		High Involvement Plants Time 2	
Scale:	Mean	S.D.	Mean	S.D.
Job Satisfaction	5.7	1.2	5.8	1.1
Trust	3.7	1.4	4.9	1.2
Big Picture	5.7	1.0	5.5	0.9
Job Variety	5.2	1.5	5.5	1.0
Job Identity	4.5	1.6	4.9	1.2
Job Autonomy	5.4	1.3	5.7	1.0
Task Feedback	4.5	1.6	4.7	1.3
Supervisory Participativeness	4.3	1.7	5.0	1.1
Supervisory Consideration	4.4	1.7	4.8	1.5
Supervisory Prod. Orientation	4.8	1.5	5.2	1.3
Team Participativeness	4.5	1.5	5.4	1.3
Team Consideration	4.5	1.5	5.1	1.3
Team Production Orientation	4.7	1.5	5.0	1.2
Team Control of Costs	4.9	1.5	5.0	1.3
Teamwork	4.6	1.5	4.7	1.2
Innovation	4.8	1.3	5.3	1.3
Intergroup Cooperation	4.5	1.4	4.7	1.1
Influence over Way Work is Done	3.4	1.1	3.7	0.9
Influence over Planning & Sched.	2.9	1.4	3.3	1.1
Influence over Quality	3.4	1.1	3.9	0.8

NOTES:

1. T2=1990-1991; N=12 plants and subunits (2405 respondents)
2. Established Plants (Time 2); N=7 plants and subunits (2098 respondents)
3. High Involvement Plants include both Greenfield plants and Conversions (Time 2); N=5 plants and subunits (307 respondents)