Title

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Abstract

We discuss an emerging employment system characterized by a high degree of employment security with flexible job assignments, employee involvement in problem solving and continuous improvement, and continuous training of employees. We call this model the SET system (for Security, Employee involvement and Training) and examine case studies of five U.S. firms that are attempting to establish or maintain a SET system. We find that SET systems are difficult to implement in a gradual and partial manner. The three elements of SET reinforce one another and firms that are successful in adopting SET have made an investment to implement all three SET elements simultaneously.

The SET System

Recent research on employment practices in the United States (Kochan, Katz and McKersie 1986; Osterman 1988; Brown, Reich and Stern 1991) has described an emerging employment system, characterized by (1) a high degree of employment security based upon flexible job assignment, (2) employee involvement in problem solving and continuous improvement, and (3) continuous training of all employees. We will denote this model as the SET system (for Security, Employee involvement and Training). The compensation system may include motivational rewards for company performance (profit-sharing), team performance, and skill acquisition (pay-for-skill). In unionized settings, the union and company have a cooperative relationship, and grievances are settled informally at the first level whenever possible.

The three elements of SET are central to what has been described as the prevailing system in large Japanese firms (Aoki 1988 and Koike 1988). Employee involvement in problem solving, continuous skill upgrading, and high levels of employment commitment are not, of course, universal in Japan. Nor are they uniquely Japanese features, as they also form elements of successful European experiences as well. (See, for example, Soskice 1989 and Streeck 1989.) As Turner (1990) and others have emphasized, more centralized labor-management relations also form an important part of the European story.

Until recently, the SET system could be found at a small subset of large companies and often only among salaried employees in the United States (Foulkes 1989). It now is said to be spreading to more firms and to more hourly employees as well. (See, for example, Dumaine, *Fortune Magazine*, May 1990.) Such diffusion is predicted by the widely-cited analytical model of Kochan, Katz and McKersie (1986). American firms, both with and without unions, are being urged to move toward SET, on the grounds that SET will make U.S. producers more competitive in world markets (Walton, 1987; Dertouzos and others, 1989; Womack, 1990), maintain high wages and living standards (Cohen and Zysman, 1987; Commission on the Skills of the American Workforce, 1990) and provide more satisfying working conditions as well as a more equitable distribution of employment and income (Osterman, 1988).

The SET system contrasts with the employment system that has prevailed in the past fifty years in unionized firms, whereby security is determined by seniority, employee involvement is impeded by a traditional adversarial relationship between the union and management and by narrowly defined job classifications, and firms make only minimal investment in training hourly employees. In this paper, we refer to this set of practices as the JAM system (for Job classifications, Adversarial relations, and Minimal training).

In JAM, workers have well-defined specialized tasks, and they move up a ladder of job titles differentiated by small increments in pay and more desirable characteristics.

Pay is based on seniority, since seniority determines job assignment (with skill the deciding factor only if there is a "head and shoulders" difference). The union bargains production standards (that is, line speed) and work rules for job assignment. "Quasi--security" for more senior workers exists since layoffs are based on seniority. The union and company have an adversarial relationship in which the union uses the grievance system, work rules, and work stoppage as its basis of power, while the company uses worker discipline, automation with declining employment, and plant closure as its basis of power.[1]

Figure 1 suggests how the three elements of SET reinforce each other, in theory. Employment security enhances employee involvement because employees are more willing to contribute to improvements in the work process when they need not fear losing their own or their coworkers' jobs. Employment security contributes to training as both employer and employee have greater incentives to invest in training. At the same time, training reinforces employment security because more highly skilled workers will be more productive and adaptable to new conditions, and training strengthens employee involvement because better trained workers have more ideas to offer. Employee involvement contributes to increased training by making the need for situated learning more evident and by increasing employees' interest in training. Finally, employee involvement also enhances employment security as higher productivity and quality make the company more competitive.

How do SET systems work in practice? If the SET system is so attractive, why is it not yet more widespread? What factors enter into the benefits and costs of firms moving toward SET? This paper addresses these issues through case studies of five U.S. firms that are attempting to establish or maintain SET.

Theoretical Framework

With a given capital stock and wage structure, the productivity of individual workers and their flexibility in deployment determine total output and unit labor cost. An effective employment system must provide an efficient use of labor, and it must be viewed as fair by the worker. Both goals can be achieved in either SET or JAM. Companies with a SET system achieve efficiency by combining employment security with broadly-defined jobs, flexible job assignments, transfers within a plant and across plants, and a buffer stock of unprotected labor. Productivity is enhanced by employee involvement in on-going problem solving and in suggesting and implementing improvements. Quality is accomplished by training workers to perform each job well, by cross-training workers, by training them to do inspection and maintenance tasks with each job task, and by retraining workers when they are transferred as a result of changes in demand or technology. Fairness is rooted in job security and in the implementation of employee suggestions, as well as in the more traditional ways of equitable assignment of jobs and application of rules.

Companies with JAM systems may achieve flexibility by adjusting the size of the work force according to production needs and by breaking jobs into minute tasks that can be quickly learned. Efficiency is accomplished through workers' proficiency that results from specialization in job tasks and from automation. Quality is sought through reduction of defects that accompany changes in job tasks, and by computer monitoring of work in process. Fairness is rooted in the seniority system and the detailed job classifications, which constrain arbitrary decisions by the supervisor in job assignment and promotions, and by application of work standards.

Both systems create a group of protected workers and a group of workers who serve as a buffer to absorb changes in demand, product mix, or technology. Under SET, the buffer group of workers usually are separate from the SET workers, who have job security and an expectation of retraining. By definition, the buffer stock of workers cannot have security. These workers include workers who are hired "temporarily" within the plant to perform tasks similar to those done by the protected workers. Under JAM, the buffer stock is embedded in the system through seniority, so that the division between the protected workers and the unprotected workers is not as sharp. Since companies can lay off JAM workers according to production needs, the use of temporary or subcontracted workers is more important for reducing wage costs than for providing flexibility.

Under a JAM system, the union has short-run power over its job control on the shop floor. In a well-functioning JAM system, where the union and management have a good relationship, workers engage in informal problem solving and improvements. Foremen also have the cooperation of the union in using workers in a flexible manner as needed. However, if JAM workers are dissatisfied, they can work in a routine manner and resist reassignment; they will not solve problems or make improvements. As a result, the production process does not work smoothly, many defects occur, and the line is down frequently. In the short run, the company is at the mercy of the goodwill of the union and workers. But the company has long-run power since it has total control over the location of plants and product placement. With a good relationship between the union and management, the union may have some input into the decision making about plant location and capital investment; but in the long run, the union and workers are at the mercy of the company.

Under SET, the union and workers are exchanging some of their short-run power on the shop floor for increased power in the long run, mainly through improved employment security. The company is increasing its short-run power by having formal control over job assignment. It also expects a commitment by workers to solve problems and to make improvements in the production process to reduce downtime and defects. In exchange, the company makes a commitment to keep the workers employed. This usually entails not moving jobs elsewhere as soon as the company otherwise would.

The economic environment, especially the variability of demand, as well as the presence of the union and the organizational structure, affect the effectiveness of a SET or JAM system. Periods of long recession put great financial strains on a company with a SET system and usually result in a decreased commitment to security. In contrast, long periods of economic growth and tight labor markets result in the security commitment having a lower cost relative to a policy of relying on external labor markets for qualified people. The reciprocal loyalty inherent in employment security also leads to lower turnover than would otherwise occur in tight labor markets.

As mentioned above, a number of researchers have suggested that SET systems have become more efficient than JAM systems. The contemporary economic context, characterized by faster change in production technology and product mix, requires greater flexibility in job assignments and more problem solving by production workers. The cooperation and information sharing of SET is thought to produce greater advantages than the specialization of JAM. If so, what prevents SET from being implemented more broadly?

The Case Studies

To protect confidentiality, we use pseudonyms for our five firms. Hi-Tech, one of the large companies in our study, is a Fortune 100 manufacturing firm. Hi-Tech has received favorable publicity for its success in developing new products to compete in foreign and domestic markets, and for its investment in training hourly employees. Its stock did very well during the 1980s. Hi-Tech is a non-union company. At the time of our study, Hi-Tech was introducing SET systems into both its newer and older factories. We studied both the company-wide policies and the variation in experiences at three different plants.

Another manufacturer in our sample, Together Manufacturing, is a unionized single-plant company. It was formed as a joint venture of an American and a Japanese company, after the American company had endured years of poor performance at the plant and finally shut it down. Most of the approximately 2,500 employees used to work in the plant under the former management. Together Manufacturing has been widely recognized for its effective use of the SET system by achieving outstanding results in labor productivity and product quality.

The third company, Traditional Manufacturing, is a large manufacturer in the same industry as Together Manufacturing. It has struggled, with mixed success, to transform its operating plants from JAM to SET. Our case study focused on a specific plant that was experiencing problems in making this transformation. This plant employs about 2,000 hourly workers and is unionized.

The other two firms in our sample are in the service sector. CommEx employs approximately 60,000 people and most hourly employees belong to one of three different unions. CommEx has been regarded as a successful model of cooperative labor relations. It has also been financially successful, and its stock performed well in the 1980s. The fifth company, Valley Life, is a small non-union insurance company, employing approximately 250 people. It has attracted national publicity, including an award from the U.S. Senate for productivity improvement in 1987, for restructuring its customer services along the lines of SET. It has maintained the highest evaluation from A.M. Best Company, which rates insurance companies for financial soundness and overall management.

Each of these five establishments has made deliberate efforts to institute SET, and four have been financially successful. All five firms also pay relatively high wages for hourly employees, ranging from approximately $10 per hour at Valley Life to nearly $16 at Traditional Manufacturing and Together Manufacturing, compared to a national average of $9.59 for nonfarm production workers in 1989 (U.S. Department of Labor 1990). Regarding these as a sample of best-practice companies, we approached them with the intention of learning how they were trying to make SET work.

To gather data for this study, we have visited these companies frequently, conducting numerous interviews with various levels of management, with union officials and with production workers. We have observed the work process for short periods of time at many different production sites in these companies. We have sat in on training sessions and, in three companies, we have conducted questionnaire surveys of employees. We have also collected qualitative and quantitative information from published reports and from the companies themselves.

Our presentation of the case study evidence is organized as a cross-company comparison of 1) employment security arrangements at each company, 2) a comparison of their employee involvement programs, and 3) a discussion of their training issues. As a guide to the comparative discussion, Exhibit 1 summarizes the status of each of the elements of SET at each of our companies.[2]

Employment Security

The plant we call Traditional Manufacturing belongs to a large multi-plant company that faces long-run surplus capacity. A guaranteed number of jobs as well as supplemental unemployment benefits and guaranteed retirement pay for long-tenure workers had been negotiated in the national contract. But the local union received no guarantee that the plant would not be closed. The company president was quoted as saying "Jointness [i.e., labor-management cooperation] isn't job security, but if you don't have it, your chances of having job security are pretty slim" (*Wall Street Journal*, 1990). The attempt to implement SET in this situation of distrust resulted in fewer improve-

ments than desired by the management or union.

The income security provisions in the national contract made a transition to employment security expensive in the short run to the company and less appealing to workers, especially those with more seniority. The company had to be willing to give up using the Unemployment Insurance system to subsidize short-run layoffs for retooling and inventory control, while the union had to be willing to give up paid time off for these short-run layoffs, in order to capture the possible long-run gains associated with employment security. The company was relying on employees' cooperation to reduce costs and improve quality in hopes of reducing the number of plants that would be closed in the coming years. But this strategy put the more senior workers' short-run and long-run interests in conflict and it put senior and junior workers' interests in conflict. Performance at the plant did not improve, and it is now scheduled to be closed in 1992.

This failure contrasts with the case of Together Manufacturing, where the new management has made genuine changes toward a SET system. The union and employees have accepted less control over job classifications, higher penalties for absenteeism and more responsibility for enforcing the employees' obligations, and management accepts employment security, training obligations, and some shared decision making. Work effort has increased because the line is down less often, employees are absent less (and therefore paid more), and they no longer have paid time off while unemployed for short periods. Together Manufacturing and the union successfully traded employees' commitment to increased effort, training, and continuous improvement in exchange for long-run employment security. The company's commitment to employment security was further underscored when the Japanese partner agreed to add a new line to this plant, increasing the workforce by approximately one-fifth.

In another industry, CommEx provides an example of a company that abandoned its progress toward replacing a JAM system with a SET system. CommEx weakened its employment security as its economic environment became more competitive and major reductions in the workforce became necessary. In addition, major change in management in 1989 resulted in more emphasis on profitability and less emphasis on security and union-management cooperation. Although it is in a regulated industry, CommEx has experienced a major change in its regulatory environment from a cost plus pricing system to a system that allowed the company to keep a portion of cost reductions. Since earlier changes in regulations were allowing new entrants into some markets, CommEx had already become oriented to lowering prices rather than providing on-demand service.

CommEx's technological environment was also changing. The company has been implementing new labor-saving technologies over the past decade. Technological change required many employees to learn the new technology in the old job or to move to a new job (and possibly new location).

Workers at CommEx used to expect secure ("womb to tomb") employment. In 1986, CommEx and its major union negotiated formal employment security provisions in the contract to protect workers from these regulatory and technological changes. Security was conditional upon employees meeting standard performance criteria and accepting reassignment, retraining, and relocation. In return, compensation included a team-based incentive scheme and no COLA. At the same time, Union-Management Committees were formed to cooperatively reassign or retire workers on a voluntary basis in a major downsizing effort. During the three-year life of the contract, no layoffs occurred and fewer than 50 employees were forced to relocate or resign, although many workers voluntarily transferred to new jobs or retired. The non-salaried workforce declined by seven per cent, which followed a 14 per cent decline in the previous two years.

At the next round of negotiations in 1989, CommEx was no longer willing to have transfers on a voluntary basis only. A strike, following a breakdown in collective bargaining, destroyed the basis for cooperation, and the company has now begun a more forceful relocation and downsizing process. Union involvement in the complex process has reverted to the traditional role of processing grievances in response to actions that appear to violate the contract. Between September 1989 and the end of 1992, CommEx predicts that, after allowing for attrition (9 per cent) and new opportunities (4 per cent), 8 per cent of the workforce will be declared surplus, that is, subject to termination.

The impact of these changes in CommEx's handling of job movements and reductions, which now are being done without the involvement of the union, remains to be seen. However, one sign of union resistance and of declining employee morale can already be seen in a sharply increased grievance rate.

Security has been reduced in several ways at CommEx. Employment security now includes the requirement that employees accept involuntary reassignments, including downgrades and non-commutable transfers. If employees "voluntarily" accept a downgrade, they receive up to three years of wage protection, based upon seniority. If employees quit during the voluntary phase, they receive severance pay based on years of service. Employees in surplus job titles are also eligible for an early retirement plan, which adds three years to their service and age for calculating retirement benefits.

At CommEx, after 1986, union-management cooperation focused primarily on the downsizing issue, and other parts of SET, such as reduced number of job classifications and employee involvement in decision making, were absent. The union and CommEx had set up a Joint Training Advisory Board, but neither party was able to use this program to advance employee involvement programs. Although CommEx has some employee involvement programs, they are scattered and do not involve the union.

It is too early to judge the impact of CommEx's retreat from SET. CommEx may find that the costs in effort, morale and quality resulting from decreasing security and

decreasing union involvement in decision making are higher than anticipated. In our survey of employees, unionized employees reported increased stress on the job (76 per cent) and diminished job security (70 per cent). The overwhelming majority reported labor-management relations as poor (52 per cent) or fair (36 per cent).

On a smaller scale, downsizing has also taken place at Valley Life. The company had a long history of employment security; it did not lay off employees even during the Depression of the 1930s. Nevertheless, in 1989 a new CEO declared it was necessary to cut payroll. Given Valley Life's smaller size and absence of a union, this was accomplished much more quickly than at CommEx. Approximately 16 per cent of the company's employees took early retirement, accepted a voluntary severance package, or were asked to leave. Within the Customer Service group, the number of Customer Service Representatives was reduced from 27 to 22. In addition, the Customer Service teams had to take on the task of distributing mail and documents which had previously been done by four workers who were laid off. The company indicated that this downsizing was a one-time event, and that employment security would continue for the remaining employees.

Hi-Tech, a non-union company, has a strong employment security policy for senior hourly employees. The company will not dismiss a senior employee except for reasonable cause, poor performance, or if the employee refuses training. In the event of layoff, company policy is to ignore whether an employee has passed the company's basic skills test, and to determine the order of layoff strictly by seniority. Layoffs of junior workers have occurred in the company's older plants when product demand has slackened. Top management continues to emphasize its commitment to employment security for senior hourly employees. They are seen as loyal, "tried and true", and as positive role models for new employees.

Although systematic quantitative data on security across firms are not available, we constructed a quantitative although imperfect index of employment security by using our survey data on employees at CommEx and Valley Life (see Table 1). Employee responses to three questions were tabulated based on a five-point scale, with higher scores indicating greater employee expectations of employment security at their firm.

Although both CommEx and Valley Life had already experienced layoffs, Valley Life had reaffirmed its commitment to security, and CommEx had announced more expected layoffs. Consequently, employees at both companies viewed past security as low. At CommEx, employees reported much greater day-to-day uncertainty about the future of their jobs than at Valley Life. The overall Employment Security Index was lower at CommEx (46 per cent) than at Valley Life (56 per cent).

Despite each organization's internal efforts to create security as part of SET, the external market environment has played a pivotal role in outcomes. However, the

companies have differed in their willingness to bear the costs of employment security. Employee commitment has been strengthened at Together Manufacturing by management's success in avoiding layoffs during downturns in demand for its product. In contrast, increased economic competition brought on by changes in the regulatory environment has undermined cooperation at CommEx. Although Valley Life felt compelled to make one-time layoffs, morale problems were minimized by the company's reaffirming its commitment to security. Traditional Manufacturing's unwillingness to provide security to the local plant undermined commitment from the union and workers.

Employee Involvement

Our case studies exhibit a spectrum of EI activity, from transitional to established. Together Manufacturing, Valley Life and a new manufacturing plant at Hi-Tech have all succeeded in establishing EI programs, whereas employee involvement is still in a transitional phase with an uncertain outcome at Traditional Manufacturing, CommEx and the older factories of Hi-Tech.

Employee Involvement at Together Manufacturing

At Together Manufacturing, all production workers belong to teams. Whenever possible, team members solve production problems themselves, rather than call on a skilled trades person or management representative. Under normal circumstances, team members rotate jobs, in order to balance effort, reduce repetitive motions, and improve job satisfaction. Job rotation also generates equity and promotes team problem solving. Teams can make limited decisions, such as how frequently to rotate jobs. Team members can stop the assembly line when a problem develops, without facing disciplinary action.

At Together Manufacturing, team members standardize their own jobs. In traditional large-scale manufacturing, this kind of analysis is done by engineers. At this company one might therefore say that I.E. (industrial engineering) has been replaced by EI (employee involvement).

Together Manufacturing's team concept is based upon equalization of jobs into three job classifications—one for production workers and two for trades people. The union leadership strongly opposes pay for knowledge, and management emphasizes that the equalization of job titles (and pay) allows the most flexible use of workers. A consensus seems to exist that skill-based pay would lead back to the old system of conflict over classification, and less flexible use of workers. At Together Manufacturing, flexible use of workers for consistent, steady production does not usually mean moving workers around between jobs (although this does occur.) More importantly, flexibility means workers doing a variety of tasks on their jobs, such as maintaining equipment, doing minor repairs, and inspecting their own work. This flexibility within the job cuts down on the need for flexible use of workers among the jobs.

The team leader is a coveted position because it carries status and responsibility (as well as a $0.60 per hour pay premium). The team leader usually is not assigned a regular job, although on some small teams the leader does have a regular job. The leader is able to perform all the jobs of the team "as a model worker," and the leader's role includes motivating members and maintaining good communications. He or she fills in for absent team members, trains team members, gives appropriate job assignments and adjusts the work assignment if inequities or unevenness exists, makes reports (including reports on defects, attendance, safety, and supply orders), and handles minor problems (i.e., abnormal or unusual situations). Under the former management, these jobs were done by workers in training, relief, repair, inspection, and supervision. The training and relief jobs do not exist at Together Manufacturing, and the number of maintenance workers, inspectors, and supervisors is lower. So having one out of six hourly workers without a regular job is probably no higher than the ratio at a traditional American plant.

Under this team system, both team leaders and group leaders report spending less time with grievances and more time in training. The focus on training and problem-solving seems to be a key element in improving both productivity and working conditions at Together Manufacturing under the new management.

Both individually and within the team, Together Manufacturing workers are expected to solve problems occurring on the job. The culture of making small but continuous improvements drives the suggestion and problem-solving activities. One team member said, "We improve it even if it ain't broke, because if we don't, we can't compete with those that do." Improvements cover all aspects of the production process, including efficiency, costs, safety, quality, and communications. The preconditions for continuous improvement are trouble-free machines and standardized work procedures as well as good record keeping, which provide a functional base line from which to make improvements. On the shop floor, continuous improvement usually involves improvements in layout or in operation methods. Members use their job knowledge to practice continuous improvement. As one member said, "Every job has a secret short cut or formula."

Many small problems are solved daily, often by the member pulling the stop cord to get help. All members are told they have a duty as well as a right to pull the stop cord to fix a defect, or solve a quality or safety problem. If the problem is solved before the cycle time is up, as is usually the case, the cord is pulled again and the line is not stopped. Otherwise, the line stops at the end of that cycle time.

The stop cord allows problems to be solved on the shop floor as they occur. The practice under the former management was to have problems pile up as grievances until sometimes work stoppages occurred over production standards or safety. The stop cord also helps identify areas where job assignments may be unrealistic and where work may

need to be redistributed, or where machinery or the production process may have problems that need to be corrected. Members distinguish between making an emergency repair on equipment and repairing to prevent reoccurrence.

The management at Together Manufacturing emphasizes the importance of team members' suggestions for continually improving quality and reducing cost. In 1988, more than 70 per cent of team members participated in the company's formal suggestion program, contributing approximately six suggestions per employee.[3] This is high by U.S. standards, though some companies in Japan reportedly get as many as 100 suggestions per employee per year.

The problem-solving role of non-salaried team members at Together Manufacturing now extends beyond the walls of the plant itself. For instance, team members have been sent to work with materials suppliers who have trouble meeting Together Manufacturing's quality standards.

Employee Involvement at Hi-Tech

The case of Hi-Tech provides an example of a nonunion company that is trying to institute SET. Although the changeover is generally being accomplished at Hi-Tech in conjunction with the introduction of new technology, we observed instances where the SET system was implemented without changing the technology. Hi-Tech employees have been told that everyone, even those who do not change jobs, will eventually work in a SET system.

In the traditional plants of Hi-Tech, individual operators are responsible only for making their daily quota of parts. If operators work at different rates, or if problems are encountered somewhere in the sequence, inventories of partially assembled components begin to accumulate. Inventories may also be accumulated deliberately as buffer stocks accumulate. This traditional method of operating can be called the "just in case" approach, as opposed to the "just in time," or pull, system, which uses a stop cord to simulate a machine-paced assembly line in the absence of machine-pacing. The operator's control over pacing is reduced as the flow of production is evened out and as the amount of inventory is reduced.

A major problem with the traditional system is the high cost of financing extra inventory. Another drawback arises from damage to parts that are stacked near the assembly lines. The pull system can improve quality while also reducing inventory costs.

In the traditional system, the accumulation of work in process also means longer cycle times in manufacturing. For instance, the cycle time for production of a particular component at a traditional Hi-Tech plant in the United States was 66 hours. In contrast, at one of the company's Asian plants, operating on the pull system, the same part could

be produced in nine hours. As a result, it was actually faster to produce the piece in Asia and ship it to the United States than to produce it in the United States.

In a Hi-Tech SET plant, all workers except the super technicians are in one grade, compared to the previous system of dozens of jobs with five to six grades. Workers undergo cross-training on the job, and they receive pay for skill. Workers are responsible for assembling, testing, inspecting, and repairing their own work. An entire line, numbering from several workers up to thirty or more workers, acts as a team. Jobs are rotated, although usually on a weekly or monthly basis. Job assignments are made by the supervisor according to production needs.

In sections of the production process that use automated machinery, workers can stop the line if three defects in a row are found. This usually happens when a new product is introduced, which is also when most of the problem solving occurs. New products are introduced often, since orders change frequently and the life cycle of products is short. After production of a new product is running smoothly, the production line looks similar to a traditional line since work is seldom disrupted and high volume output is emphasized.

Employee Involvement at CommEx

CommEx provides us with different forms of employee involvement. Union-Management Committees (UMCs) were given power to formulate various types of policies that would modify the contract in practice. Because of the number of committees, different types of practices could potentially arise. Both the scope and the number of committees undercut the power of the Human Relations managers and the District union representatives, who had traditionally been the primary negotiators and administrators of the contract. In interviews, both sides cited examples of incidents where the UMCs devised new policies (e.g., on health care reimbursement, on subcontracting, on call out for weekend work, and on job upgrades) that were against company policy or inconsistent with the contract and had to be modified or rescinded. These traditional keepers of the industrial relations system saw their role as having been changed from that of the "primary instigators" to the "clean-up crew." They believed that the role of the UMCs needed to be clarified and that the UMCs needed to work within a structure that prevented duplicate or competing policies from arising. In contrast, the Vice Presidents and local union presidents participating on the UMCs were generally favorable about the process of the committees and about what had been accomplished. This is not too surprising, since their power and status had been increased by the UMCs.

The 1989 contract differed significantly from the 1986 contract in the area of union-management cooperation. New language indicated that less was expected to be achieved by joint union-management efforts and that the role of UMCs was to be

reduced.[4] The broad language empowering the UMCs in 1986 was replaced by language constraining them to "service, productivity, and quality improvements and problem resolution involving operation issues." UMCs are restricted from any agreements that would modify the contract or company policy, and they cannot adjust or resolve grievances or administer the workforce qualification and movement process.

In retrospect, the 1989 strike appeared to destroy union-management cooperation. The union formally pulled out of the UMCs before they met under the new contract. With their diminished role and diminished resources, the UMCs were much less attractive to the local union presidents, and the District was glad to recoup its power. CommEx did not seem sorry to see the UMCs die.

Employee Involvement at Valley Life

Valley Life reorganized its internal operations to a SET system in 1984. Approximately 30 employees from three units were combined into a single Customer Service Unit. At the same time, 17 job titles were consolidated into one: Customer Service Representative. Within the unit, employees are organized into four teams, each responsible for servicing a particular geographic region. Customer Service teams must perform the whole range of functions; within a team, any representative may perform any functions she knows how to do. However, since employees who came from these three separate units possessed different sets of skills, no single employee knew how to perform all the team's functions. Cross-training was necessary in order to prevent bottlenecks. Instead of providing this cross-training in formal classes, Valley Life is encouraging team members to teach each other. Valley Life instituted a new "pay-for-learning" system to provide an incentive for its employees to train and become competent at all procedures performed by the teams. The result has been a successful transition to SET.

Our surveys of a sample of employees at Valley Life, CommEx, and Hi-Tech allowed for the construction of an index measuring the degree of Employee Involvement at each organization (see Table 2). The index of employee involvement consists of three sub-indices, measuring problem solving, teamwork, and employee influence on managerial decision making. The "Problem Solving" subindex was the most similar across the three companies, each of which scored relatively high on this measure. CommEx scored highest on problem solving, especially individual problem solving, because many CommEx employees are technicians who work on their own. The "Teamwork" subindex exhibited the highest scores overall, and Valley Life, where Customer Service Representatives work in semi-autonomous teams, scored considerably higher on measures of teamwork than Hi-Tech or CommEx.

The "Influence" subindex exhibited the lowest scores overall and the greatest variability across companies. Valley Life scored considerably lower on this subindex than either CommEx or Hi-Tech, which ranked first. Outside their own area of control, the

teams at Valley Life do not influence management, and this shows up in low scores. The overall low scores suggest that the firms have made more progress in implementing problem solving and team work than in giving workers additional input into decision making.[5]

Training

At Together Manufacturing, team members have received extensive formal training for their new responsibilities in problem solving and broader job tasks. Today, new hires receive one week of training in standardized work.[6]

Job rotation provides a powerful impetus for informal learning on the job. Managing the learning process is one of the main responsibilities of the team leader. A "versatility chart" posted at the team's work area shows each team member's degree of proficiency in each job. There are four levels of proficiency: knowing what the job is, being able to do it under supervision, being able to do it without supervision, and being able to teach it to someone else. The team leader decides when a member has advanced from one level to the next. If a team member is absent, the versatility chart tells the team leader who else is best qualified to do the missing member's job(s). If the team leader is absent, the chart would make this information available to the group leader (first level manager). The versatility chart thus formally records the results of informal on-the-job training.

Another set of formal courses at Together Manufacturing have equipped team members to make suggestions for continually improving the production process. Formal courses in problem solving, quality, and continuous improvement have prepared team members to participate in a range of problem-solving activities. Courses have taught techniques such as repeatedly asking "why" to trace a problem to its root causes, and diagrams for prompting consideration of human, material, and mechanical factors. Interestingly, team members and team leaders have worked along with professional training staff to design and deliver these courses, creating a substantial degree of employee involvement in the training itself.

At Traditional Manufacturing, a formal training program for team production processes was much less successful. The training was not as related to the actual production process as it might have been. But the more fundamental obstacle was that conditions of employment security deteriorated markedly at this plant, and a new management group retreated from previous commitments to team production.

Training at Hi-Tech

At Hi-Tech, to prepare for the transformation to a SET system, production workers have been given formal instruction in problem solving, cycle time, communica-

tions, and quality control. They are told why and how their jobs will be restructured under a pull system. Instead of focusing on making their daily rate on their individual machine or manual assembly operation, they are to become interdependent problem solvers. Examples of problems are machine down time, missing parts or tools, defective materials, long changeover times, poor floor layout, engineering change orders, inaccurate paperwork, and inspection delays.

The new style of production gives non-salaried employees more responsibility for quality control. Accordingly, many Hi-Tech production workers have been given classes in statistical process control. To facilitate group problem solving, they have also been given classes in interaction or communication skills.

Hi-Tech has made a systematic effort to upgrade basic literacy skills of production workers, in connection with the change in manufacturing methods. The impetus for the new corporate policy began with the founding of a new plant in 1985. Initially, the plant had been scheduled for construction overseas, but domestic managers wanted to locate it in the United States. To make it succeed, they knew they would have to abandon traditional U.S. manufacturing methods. The managers involved in the 1985 new plant startup convinced the corporate counsel to permit them to administer a written basic skills test. The new plant went on to become a huge success, and managers in other parts of the company began to emulate its new practices, including testing.

Hi-Tech developed its own proprietary test battery, which we will call the Technological Employment Skills Test (TEST). TEST items ostensibly are related to actual work at Hi-Tech, and are therefore felt to be more accurate and less vulnerable to legal challenge than commercially available tests. TEST has four subtests including reading comprehension and practical arithmetic.

Since the start of 1989, all new hires have been required to pass the company's test. After TEST was formulated, it was initially offered to current employees on a voluntary basis, and basic skills classes were offered one-half on company time and one-half on workers' time. In 1990, TEST, and classes for those not passing, became mandatory for existing workers.[7]

So far, Hi-Tech has not set a limit on the amount of time employees have to attain a passing level. However, this policy has engendered considerable anxiety among existing employees, especially among older workers with little formal schooling, and among those with limited proficiency in English. One concern is what will happen to workers who fail to pass the test after repeated attempts. Another concern is who will see the scores, even though employees are not told their own scores.

To allay these concerns, Hi-Tech is providing extraordinary support and incentives for existing employees who have difficulty passing the test. For example, in one unit 43

people did not pass when the test was first given. Managers offered a cash incentive of $3,000 for passing the test and in 1990 a teacher was brought in to give four hours of English instruction each morning to 11 members of this group who had still not passed.

Within the company, some argue that the new standards are still not high enough. Others argue that they are too high, resulting in some new hires who are more literate than their supervisors, and who may be dissatisfied with the majority of jobs that have not yet been reorganized into a SET system. Some top managers see this as a transitional problem, which they try to minimize by not raising skill standards too far in advance of job redesign.

In contrast to Hi-Tech, Together Manufacturing, which is considerably further along in employee involvement, places much less emphasis on testing general skills. The initial hiring of team members did not include any type of basic skills test, though applicants now take a 30-minute mechanical aptitude test and a 20-minute basic mathematics test. Spoken English is required, but written English is not. Some members cannot read or write English or do basic mathematics. Although some managers report that the lack of literacy hinders participation in training and in the suggestion program and prevents promotion to team leader, opinions about this vary. Presently, a high school degree is not required, and the company places more importance on simulated tests of production work and on previous work experience than on formal schooling.

New applicants at Together Manufacturing are judged on the basis of an assessment that takes three half-days. The assessment includes simulations of teamwork (discussing specific problems, making decisions, and suggesting improvements as part of a group), assembling a Lego model, and performing jobs similar to those on the assembly line. Candidates are scored on their team orientation, interpersonal skills, and task orientation in the teamwork exercises, and on efficiency and quality in the production exercise. The production tests are especially important to ensure that the candidate has the strength, endurance, and dexterity to perform the physical labor involved in heavy manufacturing. Job candidates are also interviewed by team leaders and first level managers.

To some extent, teamwork can compensate for individual deficits in basic literacy at Together Manufacturing. An example from a training module describes how one team member had another one write up a suggestion to design a new chute for easing pick-up of an assembled piece. A third team member did the necessary mathematical calculations, the team leader drew the diagram, and the first level manager gave advice. The suggestion was awarded points for saving labor time and improving safety.

The success of Together Manufacturing in eliciting useful suggestions from team members despite some members' lack of formal literacy skills may demonstrate the importance of what cognitive scientists call situated intelligence (Lave, 1988; Scribner,

1989). Evidently, workers can learn how to operate the production process, and can devise methods to improve it, without high levels of fluency in symbolic language.

An index of employee training was developed from our employee surveys data at CommEx, Hi-Tech, and Valley Life (see Table 3). Hi-Tech ranked highest, with a score of 57 per cent, and CommEx ranked third, with a score of 47 per cent. Hi-Tech's relatively high score reflects mainly its extensive formal and informal training programs. Valley Life's strengths appeared in its recognition for new skills, as one might expect from its pay-forlearning program. CommEx's relatively low score, conversely, especially reflects the low pay increases granted to CommEx workers in recent years.

Training at CommEx

Confronting an increasingly competitive market environment and accelerating technological change, CommEx has been obliged to pursue two somewhat contradictory policies: upgrading its employees' skills while at the same time reducing the size of the workforce.

Rapid changes in the nature of its business have forced CommEx to become more versatile. Its own tradition of employment stability, and its contracts with hourly employees' unions, constrain the company from simply dismissing employees whose skills are obsolete and going to the outside labor market to seek new people with the necessary knowledge. Therefore, CommEx has stepped up its educational program for existing employees. Only 31 per cent of CommEx's salaried employees possess college degrees—far fewer than at other large, technology-oriented companies.

A shrinking organization offers fewer opportunities for advancement and less incentive for employees to upgrade their qualifications in order to win promotions. This context undermines the appeal of CommEx's call for employees to obtain more education. Moreover, the budgetary constraints that have forced massive cuts in payroll might also be expected to prevent the company from making new investments in employees' education. In fact, however, the company has expanded its educational effort. Employees, for their part, have welcomed the new program as an opportunity to improve their competitive position in the outside labor market, as well as at CommEx.

CONCLUSIONS

Our field work has identified variation across companies and across plants within companies in the degree of successful transition to a SET system. A working SET system is in place at Together Manufacturing and Valley Life; Traditional Manufacturing has been unable to put together all the elements of SET; Hi-Tech plants range from successful SET factories to traditional management systems; and CommEx has been in retreat from SET.

We have observed the maintenance of strong employment security practices at Together Manufacturing and Hi-Tech, repeated decreases in the workforce and weakening of employment security provisions at CommEx, and a one-time down-sizing at Valley Life. Together Manufacturing's commitment to employment security has been successfully tested by a period of reduced product demand, but Hi-Tech's as yet has not. Traditional Manufacturing's lack of willingness to guarantee the plant would be modernized and would not be closed undermined the management's attempts to implement EI. Finally, the workers' fears became realized with the announcement that the plant would be closed in 1992.

Hi-Tech has instituted a new basic skills test as a minimum standard for employees in the participatory "Factory of the Future". In contrast, Valley Life and Together Manufacturing have succeeded in transforming their work processes with employees who might not pass Hi-Tech's test. These two companies have made learning an explicitly recognized part of daily work and have qualitatively transformed worker loyalty and motivation.

Although CommEx made initial commitments to employment security and worker retraining, its efforts at employee involvement have been limited. In response to rapid technological change, CommEx has chosen not to make a one-time reduction in its workforce, while still retaining employment security for the remaining workforce as at Valley Life.[8] Instead, CommEx has instituted repeated reductions that hamper employee involvement and reduce considerably the long-run commitment to employment security. CommEx's employment system is struggling as a result.

Traditional Manufacturing's experience indicates that income security does not provide the incentives for change and improvements in productivity that are provided by employment security. Without long-run employment guarantees, worker involvement in decision making and in learning new skills is half-hearted at best.

Our main finding is that the transition to SET involves a significant investment and change in production and employment practices, which not all companies are able to achieve. As suggested above, the three elements of SET reinforce each other. The absence of any one element of the SET system weakens the others. This interdependence

explains why the many companies that have tried to institute only individual elements of SET have had quite mixed experiences (Kochan, Katz, and McKersie, 1986). The benefits to implementing only individual elements of SET can be positive, but as other studies have found (Bartel, 1991), they may be marginal and, as we discuss below, may even produce negative results. The transition to SET is more likely to succeed when it is not implemented in small incremental steps, and this involves a willingness to invest considerable resources in a substantial reorganizing of both production and employment systems.

The transformation of a traditional, adversarial industrial relations system into a cooperative system is complicated and can result in unanticipated, even undesirable, results. The process of change may create hybrids that remain grounded in traditional adversarial relations, but which have visible components of the cooperative system. Unfortunately, these hybrid systems may worsen working conditions for employees without improving the performance of the company. For example, workers may be asked to attend classes and yet not be able to use the training on their jobs. We observed such instances, which resulted in workers feeling frustrated and disappointed and in the company feeling negative about training programs.

Some observers argue that cooperation allows employees to work smarter while others argue that they are only working harder. In a cooperative system, however, working harder and working smarter may be complements rather than alternatives. Workers may prefer to work harder in order to have better working conditions and higher compensation. Working harder may take the form of less down-time and more thinking along with less unpaid absenteeism and fewer paid layoffs. Under the adversarial system, however, unexpected short breaks at work when equipment needs repair do not provide the same type of quality time as scheduled paid time off. It may provide some satisfaction in a hostile environment if workers feel they are getting something for nothing.

In an earlier period, management was able to increase pay while keeping control over decision making. Now, during a period of intense international competition, management is willing to share some decision-making power with labor in return for lower labor costs. Because of the economic environment in which these transformations to SET are taking place, some researchers have concluded that these changes undermine labor's position and worsen the compensation/working conditions package. One argument is that workers are under more stress because labor's traditional coping mechanisms, specifically those connected to job control, have been taken away.[9]

In those plants where only parts of the cooperative system have been implemented, this outcome is theoretically possible. However, in unionized plants the actual decline in working conditions seems to be small or nonexistent in practice, as unions have been able to constrain possible abuses of the system by management. The

main outcome appears to be that the innovations themselves provide one more area for conflict between the union and management and within the union itself.

In a true cooperative system, the old coping mechanisms are replaced with new ones. Job control, which constrains management in trying to increase effort and in acting arbitrarily, is now replaced with employee involvement and team work. Over time, workers can rearrange the production process to solve problems and to even out the work flow. In the short-run, workers can get help from co-workers (especially the team leader) when needed and stop the line if required, which alleviates the pressure to get the job done with no defects. Rotation of jobs helps to ensure that the work is distributed fairly within the work group and gives everyone the required knowledge to solve production problems within their group. Employment security replaces the need for seniority to mark the order of workers for layoff.

Despite the optimism of Kochan, Katz and McKersie (1986), our findings suggest that whether and how SET systems will evolve in the United States remain open questions. As Osterman (1990) points out, employment security patterns are weakening rather than strengthening, and this has accelerated with massive layoffs in 1991. The political-economic structure of the United States -- characterized by relatively high unemployment, relatively strong business cycles, weak labor unions, labor lacking input into decisions concerning employment levels and capital investment, and long-run economic planning less important than short-run financial profits -- does not support cooperative industrial relations systems and may, in fact, penalize companies and unions that attempt to implement them. For SET to succeed, management must be willing to give up its belief that management always knows more and works harder than workers, who must be prevented from shirking or misbehaving. Workers must be willing to give up their belief that management cannot be trusted to take into account the well-being of workers, who are expendable whenever this increases profits. The success of SET in individual firms depends upon an external political-economic structure that penalizes layoffs, supports training and employee involvement, teaches a cooperative work ethic, and generates full employment.

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Exhibit 1

	Security	Employee Involvement		Training
		Employees	Unions	
TOGETHER MFG.	Yes, and maintained during periods of low product demand	Established. Teams, job rotation, suggestions, design own jobs, problem solving, continuous improvement	Cooperative union-management relationship	Cross-training (OJT) by team leaders. 40 hrs of formal training, including problem-solving skills, annually
TRADITIONAL MFG.	No. Layoffs common. Some income security	Incipient	Cooperative union-management relationship	Minimal. One-time 40 hr. program for EI
HI-TECH				
Company-wide	For senior workers only		None	Problem solving. Literacy testing and training
Old Plant	Some layoffs among junior workforce with declines in demand	Transitional. attempting to implement EI		Formal training for new roles
New Plant	Strong demand has not required layoffs	Established. Teams, job rotation, suggestions, problem solving		Skill-based pay. Crosstraining. Onetime training for EI
COMMEX	Yes, but more conditions placed upon employees (job demotions and relocations) due to downsizing	Transitional. Incipient quality program outside union-management relationship	Cooperative union-management structure abandoned	Formal and informal training, as needed
VALLEY LIFE	Yes, but one-time downsizing	Established. Teams, multitask jobs, problem solving, continuous improvement	None	Pay for learning. Crosstraining by team members

Table 1

EMPLOYMENT SECURITY SCORES[a]

	Hi-Tech	CommEx	Valley Life
S1	-	20.2	21.8
S2	-	23.9	26.3
S3	-	24.9	36.0
Total[b]	n/a	69.0 (46%)	84.1 (56%)

S1 Change in Employment Security Over the Past Few Years
S2 Employment Security in Current Job vs. Previous Job
S3 Expected Future Employment Security

[a] Higher scores indicate greater security.
[b] Total possible score: 150

Table 2

EMPLOYEE INVOLVEMENT SCORES[A]

	Hi-Tech	CommEx	Valley Life
Problem Solving			
E1	33.0	40.5	36.4
E2	27.5	30.5	29.1
E3	33.5	36.1	35.9
Total[b]	94.0 (63%)	107.4 (71%)	101.0 (68%)
Teamwork			
E4	36.7	34.4	42.3
E5	36.3	35.0	41.4
Total[c]	73.0 (73%)	69.4 (69%)	83.7% (84%)
Influence on Managerial Decisions			
E6	21.6	21.1	16.8
E7	23.9	14.0	10.9
Total[c]	45.5 (46%)	35.1 (35%)	27.7 (28%)
Overall EI Index[d]	212.5 (61%)	211.6 (60%)	212.8 (61%)

E1 I Solve Problems on my Own
E2 I Solve Problems with No Standard Procedure
E3 I Solve Problems with Others
E4 Teamwork Required on Job
E5 Coworkers Cooperate to Get the Job Done
E6 I Influence Decisions of my Supervisors
E7 I Help Design New Products/Services

[a] Higher scores indicate greater employee involvement
[b] Total possible score: 150
[c] Total possible score: 100
[d] Total possible score: 350

Table 3

EMPLOYEE TRAINING SCORES[a]

	Hi-Tech	CommEx	Valley Life
T1	30.2	25.4	24.1
T2	21.7	18.1	30.0
T3	34.1	26.3	25.0
Total[b]	86.0 (57%)	69.8 (47%)	79.1 (53%)

T1 Most Workers Have Necessary Basic Skills
T2 I'm Recognized for New Skills
T3 I Get Needed Training

[a] Higher scores indicate greater training
[b] Total possible score: 150

ENDNOTES

1. In nonunion U.S. firms, although there is wide variation, practices for hourly employees are generally more similar to JAM than to SET. Some nonunion firms provide a limited promise of employment security to their experiences hourly employees, while maintaining authoritarian direction of employees and minimal training. We refer to this combination of practices as the SAM system. (See Foulkes 1980 for a discussion of SAM systems.) Other types of nonunion systems are also important in the United States, including employers who pay low wages and are hostile to improving employees' working conditions and pay, but they are not the focus of our concern in this paper.

2. For more details of the case studies, the reader is referred to Brown, Reich and Stern (1991).

3. Together Manufacturing pays employees for suggestions that reduce cost, improve product quality, or enhance workplace safety. Payment is proportional to the amount of net savings in labor time or cost of materials, with more points added for improving quality or safety. Employees are rewarded after the suggestion has been evaluated and implemented.

4. For example, to the clause stating that the two sides will "endeavor to mutually plan and evaluate proposed actions" was added the condition "while management maintains the right and responsibility to make decisions." In another example, the language stating that when the Union representative identifies an issue or dispute, he or she will work with the manager "to jointly resolve the problem" was changed to "an effort should be made by both parties to resolve the problem." In another example, language stating "communication to the employees will be conducted jointly" concerning operational changes was changed to "where agreement is reached, communication to the employees will be conducted jointly."

5. These findings should be treated cautiously, given the measurement problems involved in these data. Technological and product differences across these firms complicate comparisons across these companies. Moreover, the sampled occupations also varied somewhat among companies, and further refinements in our statistical techniques may yield somewhat different results.

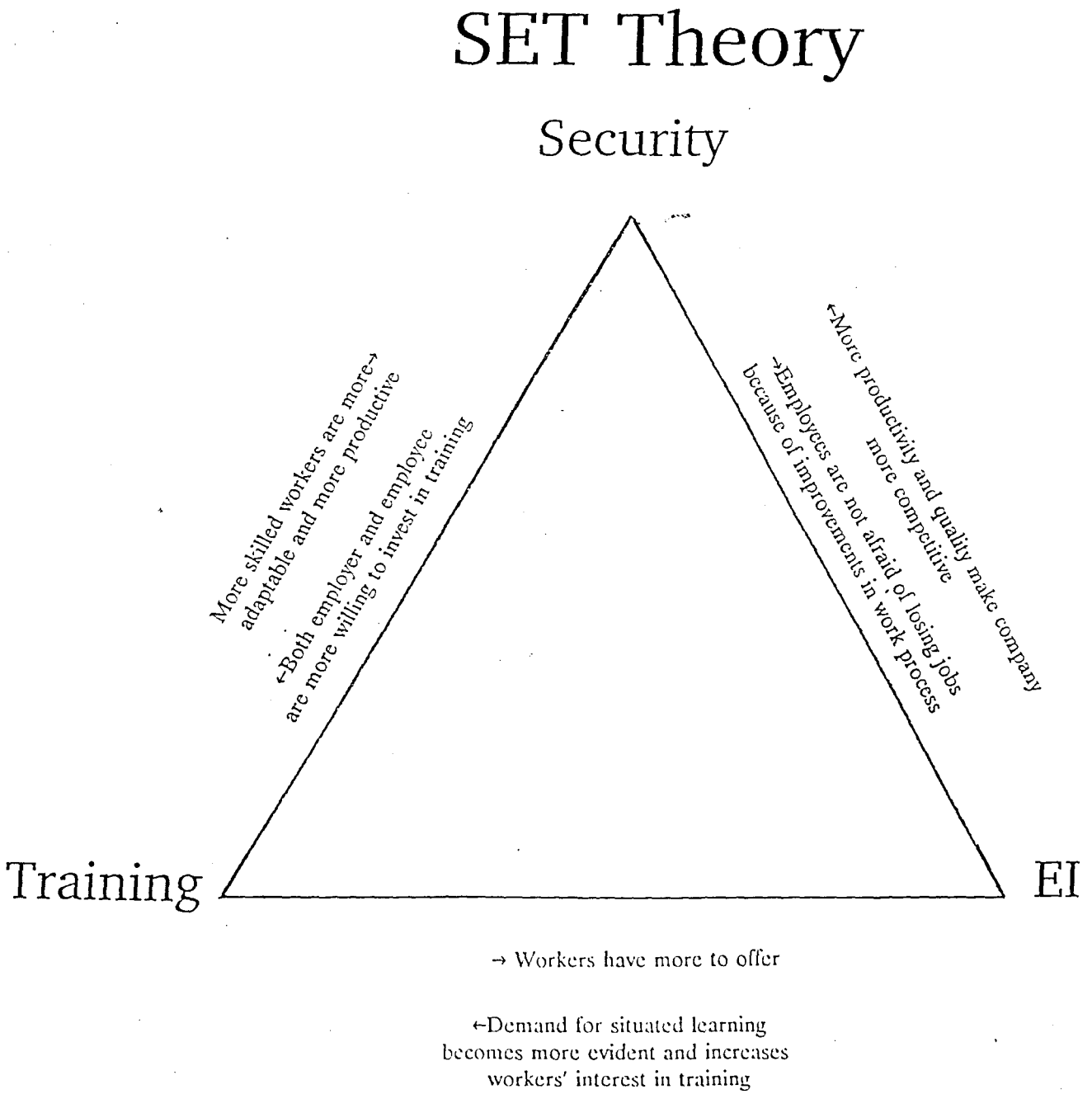
6. The course includes material from R.M. Barnes, *Motion and Time Study*, 6th ed., New York: John Wiley and Sons, 1968, as well as material on communications and problem solving. Members learn how to fill out work standardization forms, including Standardized Work Combination Table, Standardized Work Sequence, and Work Analysis Sheet.

7. Now that classes are mandatory, they are scheduled entirely on company time in order not to violate the Fair Labor Standards Act.

8. An experience similar to Valley Life is reported for the case of Digital Equipment Company by Kochan and others, 1988.

9. Perhaps the most vocal researchers are Parker and Slaughter (1988) and Fucini and Fucini (1990).

Figure 1


SET Theory
Security
More skilled workers are more→
adaptable and more productive
←Both employer and employee
are more willing to invest in training
←More productivity and quality make company
more competitive
→Employees are not afraid of losing jobs
because of improvements in work process
Training
EI
→ Workers have more to offer
←Demand for situated learning
becomes more evident and increases
workers' interest in training