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The effect of congruency between actual and desired job activities within an autonomous work group environment

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THE EFFECT OF CONGRUENCY BETWEEN ACTUAL AND DESIRED JOB ACTIVITIES WITHIN AN AUTONOMOUS WORK GROUP ENVIRONMENT

by

Jeffrey Edward Pettit

A thesis submitted in partial fulfillment
of the requirements for the Doctor of
Philosophy degree in Business Administration
in the Graduate College of
The University of Iowa

May 1993

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PH.D. THESIS

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has been approved by the Examining Committee for the thesis requirement for the Doctor of Philosophy degree in Business Administration at the May 1993 graduation.

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CHAPTER I

INTRODUCTION

Business leaders are directing their attention to autonomous work groups for many different reasons. Harper and Harper (1989) suggest that the movement for self-directed work groups is due to unprecedented changes in the business world, competition with a global work force, the need for constant improvement, workers requiring lifetime learning, work redesign, new information technology, and quicker response time demanded by customers. Goodman, Devadas, and Hughson (1988) focus on this form of group activity because (1) it is a relatively new type of intervention to improve group effectiveness, (2) self-managing teams will continue to be a major strategy in redesigning work in the future, (3) there is some evidence about the effectiveness of these teams, and (4) this intervention is a comprehensive form of change that includes modification of goals, work, job allocation, group problem solving, and pay systems.

Autonomous work groups were first studied in Great Britain during the 1950s. In the following three decades, they expanded to many different countries including the United States. Manufacturing was the primary industry for

their introduction in this country. Since then, the growth of autonomous work groups has been reported in many different industries. Popular press magazines such as Fortune (Burck, 1981) and Business Week (Blinder, 1989) have offered their readers information on these work groups as they are applied at various manufacturing and service companies. Professional journals, for example Harvard Business Review (Lawler and Mohrman, 1985), Training and Development (McCann and Margerison, 1989), and Organizational Dynamics (Poza and Markus, 1980), have provided details for advancing the development and functioning of autonomous work groups. Also, researchers have added statistical data to support the profitability and efficacy of the self-managing work group concept (Cummings and Griggs, 1968; Wall, Kemp, Jackson, and Clegg, 1986; Blumberg, 1980; Cordery, Mueller, and Smith, 1991). A common thread throughout all of the articles is that autonomous work groups have generated gains in productivity, quality, safety, customer relations, absenteeism, satisfaction, and performance.

Autonomous work groups (AWGs) are identified through many different titles. They have been labeled as semiautonomous work groups, self-directed or self-managed teams, composite work groups, high-involvement work force, semiself-managed, shared management, and empowered teams (Cummings, 1978; Harper and Harper, 1989; Goodman, Devadas,

and Hughson, 1988; Wellins, Byham, and Wilson, 1991). Throughout this study, these titles are used interchangeably.

A general definition of autonomous work groups is a group of employees (usually anywhere from five to fifteen workers) who are responsible for a whole product or process (Harper and Harper, 1989). There are certain inherent characteristics of self-directing teams. First, the teams are groups of individuals with different levels of business knowledge and work experience. The number of individuals within the groups varies throughout the literature (Cabot, 1989; Orsburn, Moran, Musselwhite, and Zenger, 1990; Owens, 1991). Second, the groups have decision-making authority when it comes to the completion of the product or service. The teams make decisions, such as stopping the process to correct a problem, which directly or indirectly affect the final outcome. Third, the teams have some degree of autonomy over their technical and social functions. They control the tasks, equipment, and physical space in order to complete a final product or service. Likewise, they have some authority over the personnel activities (hiring, discipline, training, etc.) necessary to sustain the teams. Finally, the groups are responsible for their decisions. This accountability instills ownership and pride in the final outcome. For purposes of this research, self-directed teams (SDTs) are defined as a group of employees

who are responsible for a whole product or process, with autonomy to decide what skills and activities are necessary to accomplish their goals.

Theoretical Synopsis

The basis for autonomous work group formation was derived from sociotechnical systems (STS) theory. STS theory is an attempt to structure the social and technical parts of work into a jointly optimized work system and to relate this system to its environment (Cummings and Molloy, 1977). The concept is based on the principle that any production system requires both a technology (machinery, plant layout, raw materials) and a work-relationship structure that relates the human operators both to the technology and to each other. The technology makes demands and places limits on the type of work structure possible. The work structure has social and psychological properties that generate unique requirements with regard to the task to be performed (Cooper and Foster, 1971).

STS theory was introduced in the early 1950s by Trist and his colleagues at the Tavistock Institute of Human Relations in London, England (Trist and Bamforth, 1951). The effectiveness of sociotechnical systems theory has been examined in the industries of weaving in India (Rice, 1958), automobile manufacturing in Sweden (Dowling, 1973; Griffin, 1982; Kelly, 1978; Gyllenhammar, 1977), and coal mining in Great Britain and the United States (Trist and Bamforth,

1951; Trist, Susman, and Brown, 1977; Blumberg, 1980; Goodman, 1979). Other studies have included manufacturing in Great Britain (Wall and Clegg, 1981; Wall, Kemp, Jackson, and Clegg, 1986; Kemp, Wall, Clegg, and Cordery, 1983), forestry in the U.S. (Kolondy and Kiggundu, 1980), a minerals processing plant in Australia (Cordery, Mueller, and Smith, 1991), and other types of businesses (Rousseau, 1977; Cummings and Griggs, 1976; Rao, Thornberry, and Weintraub, 1987). All have reported positive benefits from the introduction of sociotechnical systems.

There have been systematic investigations of the contingencies appropriate for the proper formation and functioning of SDTs. Blumberg (1980) explored the phenomenon of job switching behavior. Cummings and Griggs (1976) identified three conditions, task control, boundary control, and task differentiation, related to the proper functioning of autonomous work groups. Rao, Thornberry, and Weintraub (1987) and Cummings and Griggs (1976) examined the attitudes and behaviors of team members while Manz and Sims (1987) studied the external leadership of self-managing work teams. Pearce and Ravlin (1987) found that studies of the influence of SDTs on group outcomes (satisfaction, production, absenteeism, turnover, and accident rates) have consistently yielded positive results. A meta-analysis by Goodman, Devadas, and Hughson (1988) concluded that autonomous work groups do increase productivity, change

attitudes of team members, and improve safety, but no clear trends as to absenteeism and turnover could be determined. To date, none have explored the impact of role conflict on team members.

Role conflict (Kahn, Wolfe, Quinn, and Snoek, 1964; Katz and Kahn, 1978) is the simultaneous occurrence of two or more role expectations such that compliance with one would make compliance with the other more difficult. According to their theory, the individual is located in an office (a unique point in organizational space). Associated with each office is a set of activities or potential behaviors. These activities constitute the role to be performed. Sometimes a work role can require an employee to perform duties that are incompatible and in conflict with his or her basic values, needs, and desires. This sort of incongruency is referred to as person/role conflict, denoting that it consists of a clash between the expectations which the role makes and a set of expectations the employee makes on him or herself (Pinder, 1984). Studies consistently indicate that role conflict can affect satisfaction and performance (Kahn et al., 1964; Katz and Kahn, 1978; Fisher and Gitelson, 1983; Jackson and Schuler, 1985). However, there is no research as to the impact of role conflict in an autonomous work group environment.

Need for the Study

The broad guidelines of sociotechnical systems theory,

however, make it difficult to translate from the general tenets of the theory to either a set of testable propositions about the conditions under which autonomous work groups will or will not be effective, or to the specific action steps that should be taken to create and maintain such groups in different organizational settings. In particular, it appears necessary to flesh out the principles of sociotechnical systems design in the following three areas: (a) characteristics of jobs and tasks that prompt effective work behavior, (b) individual differences among people that affect reactions to work and to work groups, and (c) internal social processes that occur among members of work groups (Hackman, 1978). The focus of this study dealt with the individual differences and the resulting effects on satisfaction and performance.

For the most part, sociotechnical systems theory research has been conducted consistently from the group level of analysis. Blumberg (1980) appears to be the only investigator to probe individual responses. Since SDTs are groups of employees, it seems logical that the group be the focus. However, Hackman (1978) indicated that a second principle of STS design that needed study was the individual differences among people that affect reactions to work and to work groups. After all, it is the individual's beliefs, desires, perceptions, and preferences that forge the team. Autonomous work groups seem to provide team members with

more latitude to accomplish their work and, at the same time, satisfy personal psychological needs. Carnall (1982) reported that opportunities may exist within such self-managed groups for individuals to work in ways which better match their own preferences.

Individual differences have also been investigated through role dynamics and the factors involved in adjustment to role conflict (Kahn, Wolfe, Quinn, and Snoek, 1964; Katz and Kahn, 1978). In an autonomous work group environment, the individual's office is the position of team member within a team. The role of each team member is to perform activities associated with the functioning of a self-directed team. There are individuals who prefer to execute some rather than all of the activities required. For example, one team member may only desire to work with machinery but not with people. Person/role conflict may occur within the human resources functions when the team member is expected to participate in hiring, disciplining, and conducting performance appraisals. Another example is that a male team member may view housekeeping activities as women's work. Consequently, he has person/role conflict when he rotates to the clean-up chores. Quite often, autonomous work groups are autocratically imposed by management for various reasons. It is possible that there are team members who do not desire to work in a self-managing work group. They would prefer the hierarchical

structure of some businesses. Accordingly, there is constant conflict between their preferences and the work role.

In identifying the supporting conditions for a viable, self-maintaining production unit, Herbst (1974) indicated that responsible autonomy and establishment of decision making at the lowest possible level are necessary. In further clarifying these comments, other researchers (Sims and Dean, 1985; Wall and Clegg, 1980; Manz and Sims, 1987; Wall, Kemp, Jackson, and Clegg, 1986; Donovan, 1986; Orsburn, Moran, Musselwhite, and Zenger, 1990; Sims and Manz, 1982; Wellins, Byham, and Wilson, 1991) have recommended that many functions normally performed by management be passed to the self-directing teams. Specific examples are rewards, task scheduling, goal setting, timekeeping, quality control, maintenance, and performance evaluations.

Table 1 was developed from the various research studies, case studies, general articles, and surveys to identify some of the activities performed by SDTs. Additionally, interviews with autonomous work groups members was used to enhance the list of activities. The table is grouped into two functional areas, Administrative and Operational (Harper and Harper, 1992). Those items which are inherent to the maintenance of team performance or are construed to be internal to the team are categorized under

Table 1: Activities or Tasks Often Performed by Autonomous Work Groups

ADMINISTRATIVE	
Compensation	Decision making
Discipline	Selection of team leader
Hiring	Setting goals
Performance appraisal	Meetings
Training	Work scheduling (overtime, time off, vacation)
Job assignment/rotation	
OPERATIONAL	
Customer relations	Plant/office physical layout
Ordering materials	Presentations to management
Maintenance	Quality
Feedback to other teams	Safety
Housekeeping	Work rules/policies

the Administrative heading. Hiring new team members, training, determining time off, and making decisions which will affect the team are some of the activities under this title. Tasks which are required to produce a product or service are considered under the Operational label. Examples of this include safety, quality control, materials, and housekeeping.

Model

Finally, Hackman and Oldham (1980), Cummings (1978), Rousseau (1977), and other researchers have suggested a need for integration of the sociotechnical systems theory with

other doctrines. The model (Figure 1) for the present study incorporates components of role dynamics and the broad guidelines of STS. It also attempts to investigate Hackman's second principle, that individual needs appear to affect how people react to work and to work groups. The focal point of this model is the autonomous work group team member. It was assumed that all team members operated within an autonomous work group environment and, to some degree, were familiar with all the activities performed therein.

The Activities section consists of two parts. First is the individual's actual job activities or those tasks which each team member performed. Assuming that all team members operated in this autonomous work group environment, it was expected that each individual participated to some degree in the activities listed in Table 1. The second component of the Activities phase is the individual's desired job activities. As indicated earlier, it may be that not all team members want to be involved with all of the tasks associated with SDTs. Therefore, the intent of this variable was to ferret out how actively involved the individual team member desired to be with the activities presented in Table 1.

The next section of the model is the Fit stage. Katz and Kahn (1978) indicated that role conflict is the simultaneous occurrence of two or more role expectations

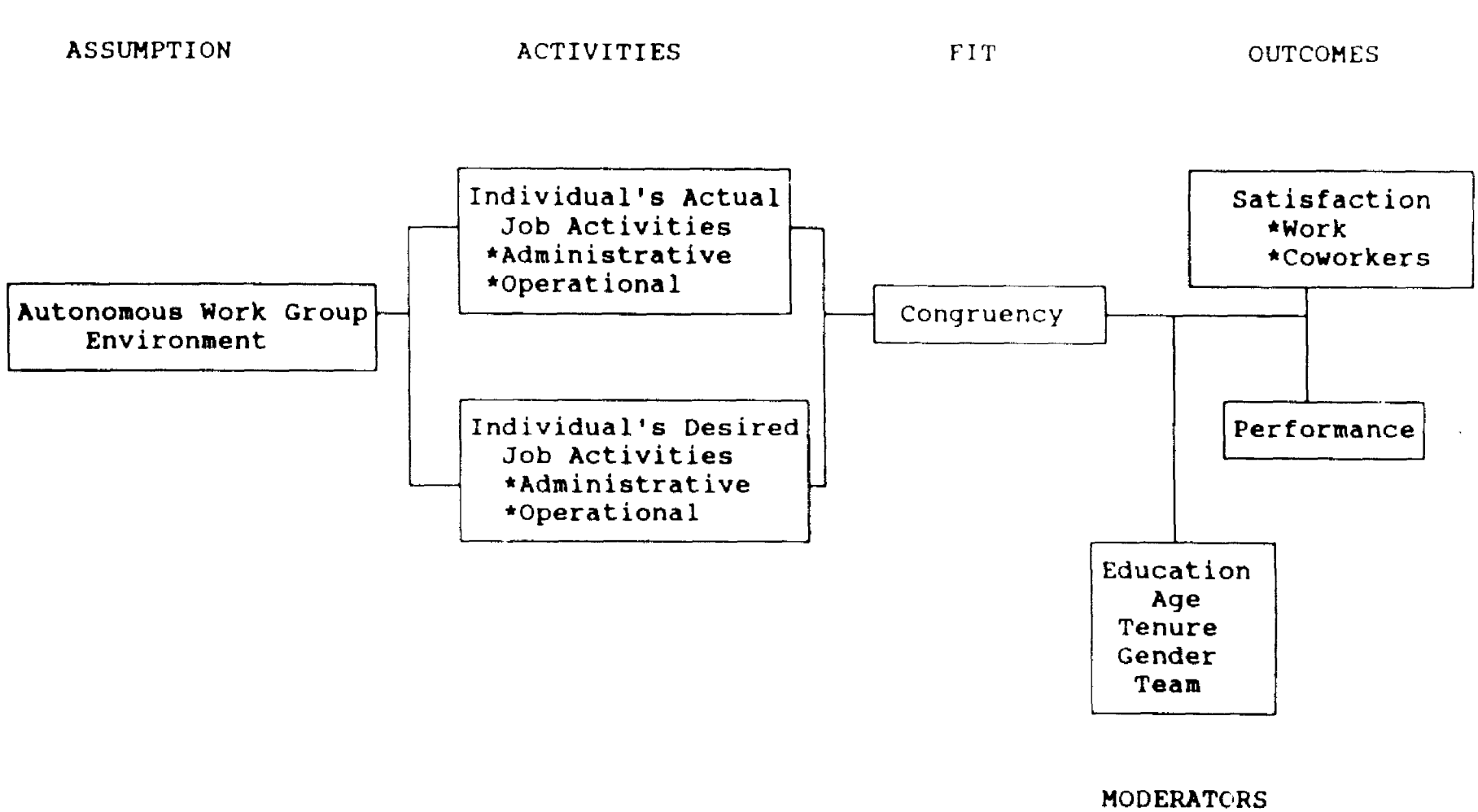

Figure 1: Congruency Between Actual and Desired Job Activities Within an Autonomous Work Group Environment Model

such that compliance with one would make compliance with the other more difficult. At this point in the model, a comparison between the actual and desired levels of participation should indicate if role conflict was present. If the individual was more involved or less involved with a certain activity than he or she desired, role conflict should result. For those team members who were congruent with their actual and desired levels of participation, no conflict was expected.

The final section of the model is the outcome variables, satisfaction and performance. Studies in role conflict (Kahn et al., 1964; Katz and Kahn, 1978) indicated that both of these variables can be significantly affected in a work environment. Research in STS frequently discovers improvement in satisfaction and performance. However, no study has investigated the incongruency between actual and desired job activities and its effect on satisfaction and performance in an autonomous work group setting. In this study, satisfaction was examined through two facets, satisfaction with work and satisfaction with coworkers (Smith, Kendall, and Hulin, 1969). Performance was measured via the team member's performance evaluations.

It is possible that certain demographic variables can influence the relationship between actual and desired job activities and the outcome variables. Certain variables may incline a team member to desire less participation; however,

the autonomous work group environment forces them to do more. Each of the five demographic variables (education, age, tenure, team membership, and gender) may alter the relationship between the involvement in the activities and the outcome measures. Research on role conflict uses age, education, and tenure in tests of moderation with varying outcomes (Jackson and Schuler, 1983; Fisher and Gitelson, 1985). The other two demographic variables were included due to interest by the plant managers and also the author of the present study.

There are several ways these demographic variables might moderate the relationship between the independent and dependant variables. A less educated person may be satisfied performing a single task. However, the work group requires them to learn more skills and rotate tasks. An older worker may be happier in a stable environment. Self-directed teams operate in constantly changing conditions. Some employees may feel that tenure at the company entitles them to a certain level of autonomy. In an autonomous work team, all members have equal say in their team's operations. Team membership may affect an individual's output if it is dominated by one person or the team is composed of independent personalities. Lastly, in the self-managing work team, men and women are required to perform the same tasks, operate the same equipment, and make decisions which will impact the team. The performance and satisfaction of

women may be affected in this equal status environment.

Purpose of the Study

The purpose of this study was to investigate the fit between the actual and desired job activities of workers in an autonomous work group environment and its effect on satisfaction and performance. There were four basic questions which arose from the model that needed to be answered. First, as perceived by the team member, how much does he or she participate in the activities performed by self-directed teams? That is to say, what does the individual actually do as a team member in an autonomous work group environment? Second, to what degree does the individual team member desire to be involved with the different activities? How active does he or she want to be in the various tasks performed by the teams? Some undoubtedly like what they do while others want to execute more or less of these jobs.

Third, what is the effect of the differences between actual and desired levels of involvement on satisfaction and performance? Is there role conflict within a SDT climate? Do the team members seem to be more satisfied and perform better in the Administrative or Operational functions? Those workers with high incompatibility scores would be expected to be less satisfied and substandard workers. Finally, do demographic factors influence the relationship between the difference scores and the outcome measures? It

may be that gender, age, education, tenure, or team membership alters the relationships as described in the model.

Hypotheses

Eleven hypotheses were proposed. The first six hypotheses concern the Incompatibility Score. This was calculated by taking the absolute value of the difference between the actual level of participation and the desired amount of input in each activity and summing the result for the twenty-one activities for each individual.

HP1: The higher the Incompatibility Score the lower the satisfaction with work and coworkers.

HP2: The higher the Incompatibility Score the lower the job performance.

The following hypotheses concern the clustered activities as derived through factor analysis.

HP3: For those activities regarded as Administrative, the higher the Incompatibility Score the lower the satisfaction with work and coworkers.

HP4: For those activities regarded as Operational, the higher the Incompatibility Score the lower the satisfaction with work and coworkers.

HP5: For those activities regarded as Administrative, the higher the Incompatibility Score the lower the job performance.

HP6: For those activities regarded as Operational, the

higher the Incompatibility Score the lower the job performance.

There are several hypotheses associated with these moderating variables: education, tenure, age, gender, and team membership.

HP7: Education will moderate the relationship between the Administrative/Operational activities and satisfaction with work, satisfaction with coworkers, and performance.

Research indicates that more educated individuals prefer to be more involved with activities and decisions that affect them in the workplace. Team members at the plant under study with a higher education level should desire to participate more than they currently do. Therefore, role conflict should exist between the actual and desired level of job activities.

HP8: Tenure will moderate the relationship between the Administrative/Operational activities and satisfaction with work, satisfaction with coworkers, and performance.

Individuals who have been with the company a long time will probably desire more involvement in all aspects of the autonomous work group activities. They may feel they know how the plant operates and can improve on the current system. If there is a discrepancy between the actual and desired levels of participation, the result should be lower satisfaction and performance.

HP9: Age will moderate the relationship between the

Administrative/Operational activities and satisfaction with work, satisfaction with coworkers, and performance.

Older workers have many years of work experience. Some have labored in different types of jobs, such as technicians turned managers. Others have been employed in contrasting work environments, from dictatorial to participative. Few, if any, have previous work experience in an autonomous work group setting. By comparing the hierarchical structures of their past to the self-directing teams, the older team members probably have more input to the decisions that affect them. Consequently, the older employee may be content with his or her level of participation. On the other hand, the younger team member has less experience. His or her first job may be as a team member in an autonomous work group environment. Based on this one company, the younger worker may assume that all businesses have self-directed teams. Therefore, younger employees may want to change operations and procedures to their way of thinking through more participation in the decisions that influence their work lives.

HP10: Gender will moderate the relationship between the Administrative/Operational activities and satisfaction with work, satisfaction with coworkers, and performance.

In a self-directed team environment, men and women are required to perform the same tasks, operate the same equipment, and make decisions which will impact the team.

All workers are expected to perform as one team, with no one more important than the other. This is in direct contrast to other businesses where women are generally treated as second-class citizens. In an autonomous group climate, women may feel more satisfied with their work environment.

HP11: Team membership will moderate the relationship between the Administrative/Operational activities and satisfaction with work, satisfaction with coworkers, and performance.

At the data facility, each employee is a member of one of the teams. Since the production teams were formed first and the staff team last, the staff group considers themselves an afterthought in the team development scheme. Also, the first production team is composed of volunteers who were very interested in starting self-directed teams. The fourth production group is composed of those employees who did not desire to work in a team environment. With this type of team development, membership should affect the satisfaction and performance of its individuals.

Implementation

Data collection occurred at a Midwest manufacturing plant. The sample consisted of 113 employees out of the 150 workers at this facility. The difference between these two numbers included seven managers, ten employees who partially completed the instrument, and those team members with time off or who were unable to leave their work station. The

plant is engaged in the production of rubber hoses and flexible couplings used in a wide variety of products. The employees have operated in an autonomous work group environment since 1984. The seven teams at this facility, each with twenty to twenty-five workers, include maintenance, shipping, office and four production teams. The work week consists of three shifts for six and two-thirds days. An individual's performance appraisal is completed by the other members of the work group. There are no supervisors at this plant; however, the Employee Relations Manager, the Plant Comptroller, the Development/Quality Assurance Manager, and the Plant Manager act as support staff and information sources for all of the teams.

The design of this study was to collect data through the use of a questionnaire completed by individual team members and from company performance appraisals. There were four components to the instrument. The first component (Appendix A) contained the demographic items to be collected. The second component (Appendix B) contained the twenty-one items designed specifically for this study to investigate to what degree the individual team member actually participates in the activities of self-directed teams. Each item asked the respondent to indicate how much he or she participates in the various activities by using a scale of "Not at All" (1) to "A Very Great Deal" (5).

Reliability data was obtained from the pilot study.

The next component was very similar to the previous one. In it each team member indicated how much he or she desired to be involved in the twenty-one activities (Appendix C). The response options were the same as in the preceding component. Reliability data was obtained from the pilot study. The measure of job satisfaction (Appendix D) was the fourth component. It was developed from the Job Descriptive Index (JDI) (Smith, Kendall, and Hulin, 1969) and utilized these facets: Type of Work and Co-workers. Alpha coefficient reliabilities from previous studies that used the JDI ranged from 0.78 to 0.84 while the sub-scales' Spearman-Brown coefficients ranged from 0.80 to 0.88 (Cook, Hepworth, Wall, and Warr, 1981). The measure for job performance in the current study was obtained from the most recent company performance appraisal records of the individual team members (Appendix E).

Assumptions and Limitations

Since this was a field study, there were no control groups or individuals. Stone (1978) has identified several disadvantages and advantages to field studies. Disadvantages include the influence of unknown sampling biases, no manipulation of independent variables, measurement which is not as precise as in a laboratory, and the influence of confounding variables.

In a field study, the intent is to examine intact,

naturally occurring systems where variables are systematically measured with minimal intrusion on the part of the researcher (Stone, 1978). Field studies are useful in that they: 1) permit familiarity with a system, 2) attempt to describe a system, and 3) allow the testing of hypotheses. The current study provides information about self-managing work groups, reports that may be important to their functioning, and yields questions which may possibly be answered. This knowledge may further the already growing library of knowledge concerning autonomous work groups.

There are some advantages to this type of research. Since the study occurs in the natural environment, the investigation has a realistic quality to it. If the results can be generalized to other situations, then it is considered to have external validity. In addition, data on a large number of variables can be collected, socially significant problems can be studied, and the strengths of the independent, intervening, and dependent variables are generally greater than would be found in a laboratory experiment (Stone, 1978).

Even though this was not an experimental design, the terms independent and dependent variables were used. The independent and dependent variables were not being manipulated and it was not feasible to attempt any manipulation. Additionally, the employees at the research facility have operated as self-directed teams for several

years. It was not possible to alter the levels of the independent variables. The dependent variables, job satisfaction and job performance, likewise are not controllable. Since there were no controlled treatment variables, internal validity may be suspect.

Definition of Terms

The definitions of all important terms are listed in this section.

Administrative Functions: Activities which are inherent to the maintenance of team performance or construed as internal to the team. See Table 1 for a listing.

Congruency: Agreement between the individual's actual job activities and the individual's desired job activities.

Incompatibility Score: The absolute value of the difference between the actual job activities response and the desired level of involvement response summed over the twenty-one activities for each team member.

Individual's Actual Job Activities: The degree to which an individual team member actually participates in the tasks or jobs performed by autonomous work groups.

Individual's Desired Job Activities: The degree to which an individual team member would like to be involved in the tasks or jobs performed by autonomous work groups.

Job Performance: A composite measure of performance based upon group members' evaluations of safety and hygiene, attendance, quality, production, attitude and motivation,

teamwork, self-management, communications, comprehension, and openness.

Job Satisfaction: The feelings a worker has about his or her job (Smith, Kendall, and Hulin, 1969).

Operational Function: Activities which are required to produce a product or service. See Table 1 for a listing.

Person/Role Conflict: The simultaneous occurrence of role demands and personal expectations or values (Katz and Kahn, 1978; Kahn et.al., 1964).

Self-Managing Work Groups: A group of employees who are responsible for a whole product or process, with autonomy to decide what skills and activities are necessary to accomplish their goals. Also known as autonomous and semiautonomous work groups, self-directing teams, composite work groups, high-involvement work force, or empowered teams.

Summary

Since the 1950s, business leaders have been experimenting with and using self-directed teams. Autonomous work teams are a subcomponent of sociotechnical systems theory. This theory endeavors to optimize the technical and social facets of the work environment. However, since the broad guidelines of STS theory make it difficult to translate from the general tenets to testable propositions, special issues drawn from the theory were tested.

Several studies have reported on the efficacy of self-directed teams in productivity, quality, customer relations, and absenteeism. Most have evaluated the outcomes after introducing these teams. Few have described the functions or activities performed by AWGs. Additionally, none have combined role conflict theory with STS theory and investigated the effect of congruency between the actual and desired job activities within an autonomous work group environment. This new research utilized a sample of 113 employees at a Midwest manufacturing facility that has been involved with self-managed teams for more than eight years. A model was developed in order to compare the team members' level of participation in their actual job activities with their desired degree of involvement with these same activities and show how this congruence affects job satisfaction and performance.

The results obtained from this study provide important information for companies interested in developing self-directing teams. Identifying the actual and desired activities performed by autonomous work groups enables businesses to generate and maintain productive work teams. Also, examining the fit between actual and desired levels of participation of team members helps to improve satisfaction and performance. From an academic standpoint, this research adds to the few studies that have attempted to examine individual differences among people that affect reactions to

work and to work groups within an autonomous work group environment. Future studies can hone the essential ingredients of fostering efficient and effective self-managing work teams.

CHAPTER II

REVIEW OF LITERATURE

The purpose of this study was to investigate the fit between the actual and desired job activities of workers in an autonomous work group environment and its effect on satisfaction and performance. The foundation for this investigation consisted of literature from three areas, sociotechnical systems theory, role conflict theory, and the difference scores paradigm. In this chapter, each of the three doctrines are presented with supporting definitions, documented research, and its importance to this current study.

The idea of a self-directed work force is old and new. Experiments in this concept have been conducted since the early 1950s at the Tavistock Institute in England (Trist and Bamforth, 1951). It has only been within the last three decades that autonomous work groups have become so visible. Autonomous work groups (AWGs) are identified through many different titles. They have been labeled as semiautonomous work groups, self-directed or self-managed teams, composite work groups, high-involvement work force, semiself-managed, and shared management (Cummings, 1978; Harper and Harper, 1989; Goodman, Devadas, and Hughson, 1988). Throughout this

study, these titles are used interchangeably.

A general definition is a group of employees (anywhere from five to fifteen workers) who are responsible for a whole product or process (Harper and Harper, 1989). There are certain inherent characteristics of self-directing teams. First, the teams are groups of individuals with different levels of business knowledge and work experience. The number of individuals within the groups varies throughout the literature (Cabot, 1989; Orsburn, Moran, Musselwhite, and Zenger, 1990; Owens, 1991). Second, the groups have decision-making authority when it comes to the completion of the product or service. The teams make decisions, such as stopping the process to correct a problem, which directly or indirectly affect the final outcome. Third, the teams have some degree of autonomy over its technical and social functions. They control the tasks, equipment, and physical space in order to complete a final product or service. Likewise, they have some authority over the personnel activities (hiring, discipline, training, etc.) necessary to sustain the teams. Finally, the groups are responsible for their decisions. This accountability instills ownership and pride in the final outcome. For purposes of this research, self-directed teams (SDTs) are defined as a group of employees who are responsible for a whole product or process, with autonomy to decide what skills and activities are necessary to accomplish their

goals.

Sociotechnical Systems

The basis for autonomous work group formation was derived from sociotechnical systems (STS) theory. STS theory is an attempt to structure the social and technical parts of work into a jointly optimized work system and to relate this system to its environment (Cummings and Molloy, 1977). The concept is based on the principle that any production system requires both a technology (machinery, plant layout, raw materials) and a work-relationship structure that relates the human operators both to the technology and to each other. The technology makes demands and places limits on the type of work structure possible. The work structure has social and psychological properties that generate unique requirements with regard to the task to be performed (Cooper and Foster, 1971; Rousseau, 1977).

Sociotechnical systems are comprised of a technical and social subsystem. The technical system of an organization consists of the tools, techniques, devices, artifacts, methods, configurations, procedures, and knowledge used by organizational members to acquire inputs, transform inputs into outputs, and provide outputs or services to clients or customers. In the sociotechnical systems perspective, choices about such things as how the technology is laid out are as important as choices about which technologies to use, since the layout and type of technology both affect how

employees feel about their work and consequently, how well they perform it (Pasmore, 1988). The technical system is inanimate, following physical laws. It is also a reactive system in that people are required to initiate and control its activities (Srivastva and Cummings, 1977). Since people and machines must interact, the impact of technology upon the social system must be considered. The technological configuration chosen by organization designers constrains the operation of the social system by shaping the behaviors required to operate it. The level of variety, challenge, feedback, control, decision making, and integration provided for social system members is largely a function of the way in which the technology is arranged (Pasmore, Francis, Haldeman, and Shani, 1982).

The social system of an organization comprises the people who work in the organization. This system encompasses individual attitudes and beliefs, reaction to work arrangements, relationships between groups and among group members, individual personalities, and group norms (Pasmore, 1988). The sociotechnical systems theorist contends that identifying the needs that people bring with them to the workplace, and incorporating means of meeting those needs through the design of the technology and the work itself, is the surest way of directing the efforts of organizational members toward organizational goals (Pasmore et al., 1982). The dimensions of the social system which

are of concern to designers are complex. At the level of the individual, important design inputs include the nature of motivation, skills and abilities, capacities for learning, and attitudes toward participation. At the group level, considerations include the degree of cohesiveness, the quality of group processes, the nature of the group's task, and membership compatibility and stability.

The inception of the sociotechnical systems approach can be traced back to the early 1950s with the research conducted by Trist and his colleagues at the Tavistock Institute of Human Relations in London, England (Trist and Bamforth, 1951). They investigated the effects of a technological change in the coal mining operations in England on various social processes among the miners. The technological change attempted was an assembly line approach that focused on task specialization and routinization. Originally, the miners worked in small groups and had considerable autonomy in a number of different areas of the work system. The new system failed due to its lack of recognition of the importance of social processes in the workplace (Griffin, 1982).

The coal mine research provided two major breakthroughs for the study and design of work. First, it demonstrated empirically the validity of viewing work structures as open, sociotechnical systems. The necessity for examining the overlapping influences of the social and technological

forces with the work environment became very apparent. Second, the research provided a viable alternative to mass production work design principles in the form of composite or autonomous group concepts. The researchers suggested that the superiority of one work organization over another lies in the extent to which it meets the requirements of the task and the social and psychological needs of the workers.

Autonomous Work Group Characteristics

Since the studies of Trist and his colleagues, researchers have attempted to identify those conditions necessary for the proper functioning of self-managing teams. Herbst (1974) proposed these supporting conditions for a viable self-maintaining production unit: a) a clearly defined whole task with an easily measured set of relevant input and outcome states, b) a single social system responsible for the total production unit, c) members committed to optimizing the functioning of the unit with the outcome state as the primary goal, d) decision-making functions allowed at the lowest possible level, and e) personal responsibility based on some degree of competence, judgment, and skill. Rousseau (1977) summarized an optimal sociotechnical system as conceptualized by the theorists as a work system in which the jobs provide the opportunity to use a variety of skills, to make decisions, to complete meaningful, whole pieces of work, to learn how well one is performing, and to interact with others. The distinguishing

attributes of a self-directed team are the group's control of individual task assignments, a multiple skill-based task, and an identifiable or "whole" piece of work (Pearce and Ravlin, 1987).

Hackman (1978) suggested these characteristic attributes of most autonomous work groups: 1) the group is assigned a whole and meaningful task, 2) workers in the group each have a number of the skills required for completion of the task, 3) the group has autonomy to make decisions about the methods, scheduling, assignment of individuals and tasks, and sometimes selection of new members, and 4) compensation is based on the performance of the group as a whole. Sims and Dean (1985) indicated that to help self-managing teams succeed, organizations usually designed them with well-defined physical and task boundaries, sometimes using sociotechnical design concepts to ensure an appropriate match between technical systems and the conventions, rules, and norms governing interaction. They noted task interdependence within teams was usually higher than between teams, although buffered sequential interdependence between teams frequently existed. For the implementation of self-managing work teams, Donovan (1986) implied that managers must create a work unit responsible for a whole task, establish specific measures of the work unit's outputs, design multiskilled jobs, allow internal control over how the work gets done, identify key boundary

interfaces, establish access to information, and develop support systems.

Cummings and Griggs (1976), Cummings and Molloy (1977), and Cummings (1977; 1981) implied that there are three conditions related to the functioning of autonomous work groups: boundary control, task control, and task differentiation. Boundary control denotes the extent to which a group can define its work territory and influence transactions with its environment. Components of boundary control include a well-defined work area that members can identify as their own territory, competent individuals who possess the necessary skills, and group responsibility for boundary control decisions such as quality assurance.

Task control refers to the extent to which a group can participate in setting production goals, can regulating task behaviors, and receiving feedback with respect to those goals. Task differentiation indicates the extent to which a group's tasks form a unity having distinct identity. The group members are able to finish a job or assignment from beginning to end, influencing all the necessary steps in its completion.

In identifying the supporting conditions for a viable, self-maintaining production unit, Herbst (1974) indicated that responsible autonomy and decision-making at the lowest possible level are necessary. Hackman (1978) addressed the idea that simple prescriptions for providing groups with

autonomy and creating "whole" tasks do not provide the kind of operational specificity that is needed to guide applications of sociotechnical theory. The most distinctive feature of the transition to self-directed teams is a gradual transfer of operational decision-making authority from managers to work teams (Orsburn, Moran, Musselwhite, and Zenger, 1990). The key issue concerns which decisions teams will make (Lawler, 1986). Therefore, the purpose of this section was to identify some of the areas in which autonomous work groups are allowed to make their own decisions.

No studies have undertaken to discover what types of decisions should be passed on to the self-directed team. With regard to the types of decisions, the literature does proceed down two different paths. One group of authors advocated certain types of technical, administrative, and interpersonal skills and abilities the teams should possess. Another set of researchers identified what functions the teams performed during their investigation. As an example of the former, Sims and Dean (1985) cataloged some of the jobs as preparing an annual budget, taking on timekeeping responsibilities, recording quality control statistics, making within-group job assignments, solving technical problems, training fellow team members, adjusting production schedules, setting team goals, and assessing internal performance. Cummings (1981) reported that team members

were responsible for detecting and controlling deviations from the design goals, creating performance measures, and were free to insure that team members possess appropriate knowledge and skills either through recruitment and/or training.

Donovan (1986) explained that the team has the responsibility for deciding a wide range of issues about how the work gets done and solving the work-related problems. This is accomplished by allowing the team to schedule and allocate task assignments, establish production goals, review feedback, communicate with the necessary individuals or teams, solve their own problems, handle rewards and punishment, evaluate performance of the team and its members, and finally select team members. After visiting an organization with self-managing teams, Sims and Manz (1982) noted behavior in the areas of rewards and reprimands, task assignment allocation, work scheduling, production goal setting, performance feedback, performance evaluations for pay advancement, and member entry to and exit from the team.

The other path taken by researchers indicated what tasks the work groups were performing during the study. Wall and Clegg (1981) highlighted that each team was given control over setting the pace of production, distributing tasks among team members, organizing breaks and changeover between different lines, and allocating overtime. Manz and Sims (1987) found that the teams were responsible for

preparing an annual budget, keeping records of their hours worked, making job assignments, and participating in assessing the job performance of fellow group members. The teams also engaged in various problem solving activities that included handling scheduling, equipment, and process problems as well as group member behavior dilemmas.

In a longitudinal study of autonomous work groups, Wall, Kemp, Jackson, and Clegg (1986) and Kemp, Wall, Clegg, and Cordery (1983) found that group members were responsible for allocating jobs among themselves and rotating tasks, reaching production targets while meeting quality and hygiene standards, solving local production problems, organizing breaks, ordering and collecting raw materials, delivering finished goods to stores, and selecting and training new recruits. Rao, Thornberry, and Weintraub (1987) discovered much of the same group responsibilities with the additional requirement of being responsible for and maintaining equipment.

Table 1 was developed from the various research studies, case studies, general articles, and surveys to identify some of the activities performed by SDTs. Additionally, interviews with autonomous work groups members was used to enhance the list of activities. The activities are grouped into two functional areas, Administrative and Operational (Harper and Harper, 1992). Those items which are inherent to the maintenance of team performance or

construed as internal to the team are categorized under the Administrative heading. Hiring new team members, training, determining time off, and making decisions which will affect the team are some of the activities under this title. Tasks which are required to produce a product or service are considered under the Operational label. Examples of this include safety, quality control, materials, and housekeeping. These activities were the basis for determining both the actual and desired levels of participation.

Empirical Studies

There are not a large number of well-designed evaluations of self-managing teams (Goodman, Devadas, and Hughson, 1988). Some of the reports are of the case study method (Dowling, 1973; Walton, 1972; Walton, 1977; Poza and Markus, 1980; Manz and Sims, 1982; Sims and Manz, 1982; Griffin, 1982; Gyllenhammar, 1977; Kelly, 1978; Carnall, 1982). Rousseau (1977) investigated the combination of sociotechnical systems theory and job design research across different technologies. Kolodny and Kiggundu (1980) developed a model from the sociotechnical systems perspective in order to explain productivity variance at a forest products plant. Pearce and Ravlin (1987) produced a model for activating self-regulating work groups based upon a review of the literature.

Pasmore, Francis, Haldeman, and Shani (1982) reviewed

the development of sociotechnical systems theory and research over the past 30 years. The researchers compiled 134 experiments, many occurring in North America in the seventies in relatively small parts of organizations in existing facilities. The studies varied greatly in the detail with which the efforts were described. Of the experiments reviewed, 53 percent used autonomous work groups, involving both self-direction and interchange of tasks among members. Next, they summarized the relationships between the different sociotechnical techniques and the outcome variables reported. Because of problems associated with comparing results of these outcome dimensions, the information was based on the percentage of cases indicating improvement in each dimension. The outcome measure and the percentage of efforts both employing autonomous work groups successfully and reporting results were: productivity, 89%; cost, 85%; absenteeism, 86%; turnover, 81%; attitudes, 100%; safety, 100%; and quality, 100%.

In studying the eighteen different sociotechnical systems features, Pasmore et al. discovered that the design features most often used to improve organizational productivity were nontechnological in nature. Technological changes were the least successful, resulting in productivity improvement in 60 percent of the relevant studies. Overall, their results indicate that much of the success of

sociotechnical system interventions to date can be attributed at least in part to the creation of social structures which allow people to learn task-related skills in an atmosphere of flexibility and self-direction.

In summarizing, Pasmore et al. discussed several methodological and research issues. One issue presented was the use of different analytical models and methods. More attention needs to be paid to reporting the analytical methods used and how recommendations were derived so that experiments can be compared directly. A second concern was the variance in the diagnostic instruments and methods of measuring outcome dimensions between studies. More uniform instruments and measurement devices should be developed so that the impact on outcomes can be more readily assessed across studies. A final comment was that the study of the dynamics occurring within autonomous work groups needs to be researched. To date, only a handful of studies have looked into this most often used feature of sociotechnical system design. Further inspection may reveal ways to increase the effectiveness of such groups and extend some of their benefits to other settings (Pasmore et al., 1982).

Pearce and Ravlin (1987) reviewed the literature on self-managing work groups that were implemented in organizations. Findings from ten post-1970 field experiments were summarized around the issues of status, group composition, cohesiveness, and organizational

performance. Overall group status can be heightened by including a task segment which makes a tangible contribution to the organizational mission, and an effective training and performance feedback system to facilitate quality group functioning. The findings for group composition suggested a need to include individuals with varying abilities and attitudes when forming autonomous work groups. Specifying group goals and providing accurate performance feedback has been found to increase work group cohesiveness. The functional effects of self-directing teams have included increased employee satisfaction, reduced production costs through group members' innovations, and decreased absenteeism, turnover, and accident rates.

Goodman, Devadas, and Hughson (1988) attempted to answer the question, "Do self-managing teams improve effectiveness?" Their strategy was to look at data from individual firm studies and some of the meta-analyses that included SDTs. From the individual studies, they discovered that: (1) self-managing groups did change organizational effectiveness outcomes; (2) the effects of SDTs were greater on the attitude or quality of life indicators than on business criteria such as productivity; (3) the effects of SDTs on attitudes were not uniform; and (4) as the research design became more rigorous, the fewer the significant results.

The meta-analyses examined by Goodman et al. (1988)

were conducted prior to 1986. Based on these studies, four conclusions were submitted. First, there are not many studies of sufficient quality to provide robust answers to the question of effectiveness. Second, in the available studies, the focus has been more on measuring attitude change than on productivity, cost, or other economic data. Third, the more rigorous the design, the harder it is to identify clear, significant results. Lastly, longitudinal designs are absent in many of these studies, yet the critical question is whether these studies are viable over time.

Given these constraints, Goodman et al. provide several observations for autonomous work groups. The meta-analyses indicate that self-managing teams do increase productivity; however, the magnitude of this effect is much harder to assess. Autonomous work groups do change attitudes of team members, but the change is in attitudes specific to the intervention. The studies that measured attitudes over time found changes in beliefs and attitudes about responsibility, control, and job variety but not about general satisfaction or general commitment to the organization. As far as absenteeism and turnover are concerned, there are no clear trends in these effects on self-directed teams. Finally, there are data indicating that this type of work group can improve safety.

A study of autonomous work groups by Rao, Thornberry,

and Weintraub (1987) pondered the relationships between worker reactions and effectiveness. The researchers studied thirty work groups in a manufacturing facility. The purpose of their investigation was to explain the differences between high-productive and low-productive self-directed teams operating within the same organization. The focus was on two key areas, satisfaction with the job and the perceptions of the work group leader. Data was obtained via several different methods and a multivariate discriminant function analysis was utilized to evaluate the responses. They reported that the most productive work groups had higher satisfaction levels, specifically with promotions and supervision. Also, Rao et al. discovered that the most productive teams did not necessarily have leaders who were more team-oriented.

Rao et al. (1987) related that few studies have made a systematic investigation of the elements necessary for the proper formation and functioning of autonomous work groups. They cited as two notable exceptions the works performed by Blumberg (1980) on the phenomenon of job-switching behavior and Cummings and Griggs (1976) concerning worker reactions to autonomous work groups and the conditions for functioning, differential effects, and individual differences. It was reported in the Rao, Thornberry, and Weintraub research setting that they could establish the three factors defined by Cummings and Griggs, namely

boundary control, task control, and whole task. Each group had a well-defined work area, possessed all the necessary skills to do its tasks, was free from the external disruption of having to rely on others for task performance, had control over how to do the job, had discretion over production goals, were provided knowledge of results, and had the chance to see the job through from beginning to end. Since all these factors existed together, Rao et al. concluded the conditions for autonomous group functioning did exist.

Job satisfaction and its relationship to self-directed teams was a concern for the present study. Goodman (1979) reported that positive job attitudes were initially realized when these teams were developed. Wall and Clegg (1981) found that work motivation and job satisfaction improved. Warr, Cook, and Wall (1979) indicated that a higher level of job satisfaction was achieved through manipulation of work design. A substantial and lasting effect on employees' intrinsic job satisfaction and a more temporary effect on extrinsic job satisfaction were described by Wall, Kemp, Jackson, and Clegg (1986). Blumberg (1980) showed that job switching correlated negatively with job satisfaction. In their study, Rao, Thornberry, and Weintraub (1987) established that most productive autonomous work groups have higher satisfaction levels. After reviewing studies on individual firms that have self-managing teams and meta-

analyses that included self-directing teams, Goodman, Devadas, and Hughson (1988) found that autonomous work groups do change attitudes of team members. The studies that measured attitudes over time found changes in beliefs and attitudes about responsibility, control, and job variety but not about general satisfaction or general commitment to the organization. Their study did not explain whether general satisfaction included life, job, intrinsic, or extrinsic satisfaction. It appears from these studies that autonomous work groups and job satisfaction are positively related; however, the strength of the relationship is questionable.

The connection between self-managed work groups and job performance was also of interest. Trist, Susman, and Brown (1977) reported that accident and lost-time rates were superior while production costs decreased. However, measures of productivity and absenteeism were no different from the control group. Cummings and Griggs (1978) discovered that boundary control was significantly related to group performance and task control was correlated with absenteeism, tardiness, self- and supervisor-rated job performance, and group performance. Goodman (1980) found that safety improved, there was a slight positive effect on productivity, and production benefits slightly exceeded costs. Through the introduction of semiautonomous work groups, Wall and Clegg (1981) revealed that performance

improved. In contrary findings, Wall, Kemp, Jackson, and Clegg (1986) found no consequences for performance while labor turnover increased.

From their compilation of studies on sociotechnical systems theory, Pasmore, Francis, Haldeman, and Shani (1982) indicated that when autonomous work groups are successfully employed, productivity, cost, absenteeism, turnover, safety, and quality improved. Goodman et al. (1988), based upon studies of individual firms with self-managing teams and meta-analyses that include self-directed teams, concluded that autonomous work groups do increase productivity and safety. Consequently, there is support for investigating job performance in an autonomous work group environment.

Role Conflict

The broad guidelines of sociotechnical systems theory, however, make it difficult to translate from the general tenets of the theory to either a set of testable propositions about the conditions under which autonomous work groups will or will not be effective, or to the specific action steps that should be taken to create and maintain such groups in different organizational settings. In particular, it appears necessary to flesh out the principles of sociotechnical systems design in the following three areas: (a) characteristics of jobs and tasks that prompt effective work behavior, (b) individual differences

among people that affect reactions to work and to work groups, and (c) internal social processes that occur among members of work groups (Hackman, 1978).

Individual differences have been studied in various ways. One approach examined the effect of task design on group and social processes (Griffin, 1982). It indicated that a number of group-related processes and characteristics may affect individual interaction with other employees and their jobs. Using the group characteristics of cohesiveness, norms, and role dynamics, Griffin constructed a profile of autonomous work groups.

> In terms of role dynamics, group members may experience a moderate level of role ambiguity, conflict, and/or overload. That is, since roles are varied by the group itself, it follows that any one member may perceive unclear, conflicting, or too many task-related cues from the other members. Unclear cues may lead to role ambiguity, conflicting cues to role conflict, and excess cues to role overload. On the other hand, the member also has some control, such that he or she can clarify the cues. For these reasons, then, conflict, ambiguity, and/or overload may be of moderate concern to the group. (Griffin, p. 188)

Kahn, Wolfe, Quinn, Snoek, and Rosenthal (1964) developed the theory of role dynamics and the factors involved in adjustment to role conflict (Figure 2). According to their ideology, the individual is located in an office (a unique point in organizational space). Associated with each office is a set of activities or potential behaviors. These activities constitute the role to be

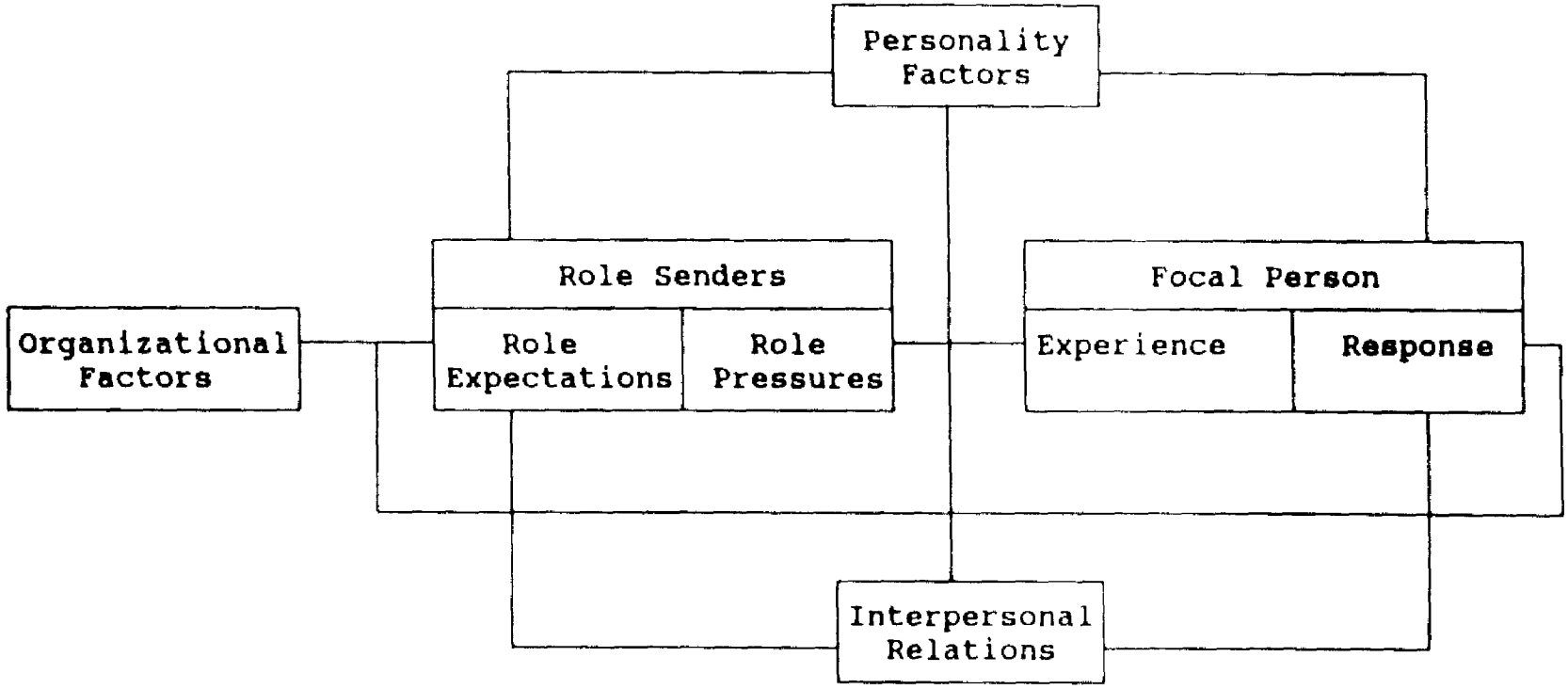

Figure 2: Theoretical Model of Factors Involved in Adjustment to Role Conflict and Ambiguity

performed. Each office in an organization is directly related to some offices and indirectly attached to others. All offices that are connected with the individual make up the role set. All members of a role set depend upon the performance of this focal office in some fashion.

There are certain pressures which are felt by the individual. The role set attempts to influence and bring about conformity from the focal person. The role set also maintains certain role expectations for this individual. The organization initiates certain pressures directed toward the focal office. Some of these include the production of the organization's goods or services, number of status levels, the individual's rank, and his or her responsibilities in the division of labor. Finally, the individual holds certain expectations about him or herself and his or her office which somehow must fit in with all the other pressures. If the above forces cause undue stress and incongruities, then role conflict occurs.

Several types of role conflict have been identified. Intrasender conflict occurs when the sender, someone in the role set, transmits incompatible expectations. Intersender conflict exists when pressures from one role sender oppose pressures from one or more other senders. A third type is interrole conflict. This type is a result of incompatible demands of different roles. Role overload, role expectations such that all cannot be performed in the

time allowed, is the fourth type. Finally, person-role conflict is when role demands and personal values and needs are not congruent. This last type of role conflict was pertinent to this current study.

As an example, a company with self-directed teams will be used. The individual in the focal office is one member of a team. Her/his role set consists of the team, directly, and the other teams and management, indirectly. The role set influences this office to behave in certain ways. This team member performs many activities just like the rest of his/her team. All members of the team depend on his/her performance of designated activities. The individual performs these according to the role set's and his or her expectations. Role conflict can occur for many different reasons.

The company expects the team, more specifically the individual, to produce their wares and satisfy the customers. The team relies upon the team member to do his/her fair share and support the team. The team member wants to improve her/his pay level and also demonstrate his/her skills to the team. Role conflict can develop when: 1) the customers are not satisfied, 2) the team does not feel the individual is performing to his/her ability or to the team's expectations, and/or 3) the team member's pay level does not improve. There is conflict because of confusion within the individual, what that individual is

doing, and the activities the role set expects. Any and all of these may cause performance and satisfaction problems.

Empirical Studies

Since the 1950s, there has been a significant body of literature and research on role theory, especially the constructs of role ambiguity and role conflict (Jackson and Schuler, 1985). In their seminal study, Kahn et al. (1964) found low job satisfaction, low confidence in the organization, and a high degree of job-related tension in conjunction with role conflict. Instead of reviewing many articles, two meta-analytic studies are reported.

Fisher and Gitelson (1983) conducted a meta-analysis of the correlates of role conflict and ambiguity. Based on forty-two published studies, eighteen correlates were obtained. Of interest were satisfaction with work itself, satisfaction with coworkers, performance (both self and superior rated), participation in decision making, tenure, education, and age. Participation in decision making and satisfaction with coworkers were negatively related and statistically significant in their relationship to role conflict. Fisher and Gitelson attempted to examine moderators but were unable to obtain a result due to lack of sufficient information in the published studies. They concluded that more research and better reporting are necessary to investigate role conflict.

Jackson and Schuler (1985) also performed a meta-

analysis on role conflict research in work settings. Ninety-six articles were obtained presenting twenty-nine correlates. Of interest in this research were participation, tenure, age, education, satisfaction with work itself, satisfaction with coworkers, and performance (others' ratings). Except for tenure, age, and education, all were negatively related and statistically significant with role conflict. The authors suggested age and tenure be utilized in moderator studies with role conflict. Also, Jackson and Schuler concluded that a more rigorous theory of the causes and consequences of role conflict should be developed.

The investigation of the moderating effects of age, gender, education, tenure, and team membership were of interest for two reasons. First, role conflict literature indicates that age, tenure, and education have been examined both as main effect and interaction variables. There is disagreement as to the effect of these three factors. The second reason was due to an interest expressed by the plant managers. After discussing the purpose and intentions of the present study with them, they inquired as to the possibility of including gender and team membership. Gender was requested because there are female team coordinators, several of whom have been very good leaders. Team membership was desired because of the way in which the teams were developed. The first team was a collection of

volunteers who were interested in the autonomous work group concept. The last production team was composed of the individuals that were not in favor of this change. Also, the office personnel and staff were not included in a team until they strongly requested it. Consequently, the demographic variables were added to the present study.

Difference Scores Paradigm

The incompatibility score developed in the present study was computed by subtracting the desired level of participation item from the corresponding actual participation item. By adding the difference values from each item, the incompatibility score was obtained and then tested for its relationship with the outcome variables. Use of difference scores has been employed by researchers for several decades. The earliest recorded use was by Porter (1962) and his Needs Satisfaction Questionnaire.

Porter investigated the connection between need deficiency and satisfaction. The need deficiency was calculated by subtracting an "is now" item from the corresponding "should be" item in five subscales. He found that the greater the need deficiency the larger the degree of dissatisfaction. Since then, deficiency or difference scores have been used in many studies (For example, see Cummings and Bigelow, 1976; Lawler, Hall, and Oldham, 1974; Wexley, McLaughlin, and Sterns, 1975).

However, the use of difference scores has been strongly

criticized. In his critique of difference score measures of organizational behavior variables, Johns (1981) described these scores as observations about work related matters which are obtained from respondents on some form of items or scales. Conceptually, certain pairs of these observations are linked such that the difference between them represents some construct. Then, the relationships between these difference scores and other variables are examined (Johns, p. 444). He continued by noting that there are three variations of this paradigm.

The first variation he labeled as the "within-person discrepancy." The within-person theme taps an individual's reaction to the organizational environment. The discrepancy results from how the environment is perceived versus how it should be. The second variation pertained to the source of the observations. Data are provided by the same individual in research using the within-person theme. Finally, difference scores have been mathematically expressed as simple absolute differences. This is based on the assumption that the direction of the score is unimportant. However, many researchers using this technique fail to report whether the direction of their difference scores was of value.

The major problems with difference scores, according to Johns (1981), are unreliability and lack of construct validity. The reliability of the difference score equals

the average reliability of its component parts only when the correlation between these components is zero. With a positive correlation between components, the reliability will be attenuated. For the within-person theme, a larger correlation between the component parts and a reduction in the reliability of the difference scores is expected. A final problem with reliability is that the instruments for data collection are developed specifically for that study. No history of reliability or even the reliability of the components can be reported.

The other concern with these scores is the problem of construct validity. Johns indicated that quite often the difference score can be replaced with a single measure which has already been tested. Another reason to dispute the use of difference scores was referred to as labeling. He cited an example where the researchers used the label "communication" when in fact it was "role ambiguity." The construct reflected the viewpoint of the researchers instead of theoretically established constructs.

Based upon the criticisms of Johns (1981), several of his suggestions for improving the use of difference scores were undertaken. First, the direction of the difference scores was not a concern. The incompatibility score was obtained by subtracting the desired level of participation from the actual level. Without using the absolute value, three directions were possible. If the desired and actual

levels were equal, the result would be a zero difference. This team member was considered to be satisfied with his or her work since h/she actually was achieving the desired level of participation. If the desired level was higher than the actual level, meaning the individual wanted to participate more, the direction would be negative and the person was deemed dissatisfied. If the desired level was lower than the actual level, the direction was positive. The individual was again considered dissatisfied since he or she wanted to participate less in the team activities. Use of the absolute value difference score did not create any problems. A discrepancy greater than zero (the satisfied team member) indicated one of the two examples of dissatisfied team members.

As to the problems of unreliability and construct validity, other steps were taken. The reliability of the component parts and the overall reliability of the incompatibility score were reported. Additionally, the reliability from the pilot study was documented. Correction for attenuation was conducted and outlined in an appendix.

There is some support for construct validity. The model for the present study attempted to investigate the fit between two levels of participation. The theoretical groundwork of role conflict was layered to demonstrate the applicability of this fit. The studies on role conflict asked general questions about the individual's perceived

levels of stress within his or her job. They did not investigate specific job activities or delve into the desired levels of participation. These last points were stated purposes of the present study. Therefore, no instruments on role conflict would be applicable.

Summary

Autonomous work groups are a derivative of a theory developed in the early 1950s at the Tavistock Institute. Sociotechnical systems theory attempts to structure the social and technical parts of work into a jointly optimized work system. These work groups are composed of employees with multiple skills who decide how tasks are accomplished and have the responsibility for a whole product or process. They have been used in different settings and studied in various ways. Researchers have suggested that more information is needed on the specific formation and functioning of self-directed teams.

Statistical studies of autonomous work groups have investigated many different outcome measures. The ones of specific interest in this study were job satisfaction and job performance. Based on investigations of these work groups in varying environments and a meta-analytic survey, there appears to be sufficient evidence to suggest a relationship between the various activities performed and job satisfaction and job performance.

As with autonomous work groups, role conflict has been

investigated in different settings. It has been found to consistently affect job satisfaction and performance. Participation in decision making, a key to self-directed teams, has also been shown to be negatively related to role conflict. How role conflict influences factors in an autonomous work group environment has not been studied. This was the basis for the current study.

In order to test for congruency, the use of difference scores was used. Although criticized for various reasons, this method has been utilized by many researchers. Some of the criticisms include reliability problems, questionable construct validity, and failure to report on the direction of the differences scores. Each of these areas was addressed and clarified in this study.

CHAPTER III

METHODOLOGY

This study investigated the fit between the actual and desired job activities of workers in an autonomous work group environment and its effect on satisfaction and performance. Its purpose was to find out: 1) how much do team members participate in the activities performed by self-directed teams; 2) to what degree does the individual team member desire to be involved with the different activities; 3) what is the effect of the differences between actual and desired levels on satisfaction and performance; and 4) what demographic factors influence the individual team members' satisfaction and performance. In this field study, data were provided by workers employed at a Midwest manufacturing facility and from performance appraisals that were available from the company. In this chapter, the research design for the investigation of a model concerning congruency within an autonomous work group environment is explained. The sample surveyed is described. A detailed description of the instruments and of the data collection approach is provided. Finally, the data analysis section reviews the statistical procedures.

Sample

The sample consisted of 113 employees from a facility of 150 employees that has operated with autonomous work groups for several years. The difference between these two numbers included seven managers, ten employees who partially completed the instrument, and those team members with time off or who were unable to leave their work station. The plant is engaged in the manufacture of rubber hoses and flexible couplings used in a wide variety of products. The seven self-directed teams at this facility maintenance, shipping, staff, and four production teams. The plant has operated in this capacity for more than eight years. Many of the employees were part of the company when it made the transition from an hierarchical structure to self-managing teams. The workers have some degree of autonomy, are allowed to perform a variety of jobs, and receive feedback on their performance from company computerized reports and from their peer appraisals. Since there are no supervisors at the facility, the Plant Manager, the Employee Relations Manager, the Comptroller, and the Quality Assurance Manager act as support staff and information sources for all of the teams.

Instruments

A multisection questionnaire was the primary data

gathering instrument.[1] The questionnaire consisted of four major components. The first component (Appendix A) contained the demographic items that were collected.

The second component (Appendix B) included those questions which examine the actual job activities. It contained twenty-one items that were used to investigate to what degree the individual team member actually participates in the activities of self-directed teams. Each item asked the respondent to indicate how much he or she participates in the various activities by using a scale of "Not at All" (1) to "A Very Great Deal" (5). Reliability data were obtained from the pilot study.

The third component (Appendix C) consisted of those items which tap the desired job activities. It contained the same twenty-one items as Appendix B. However, each team member was asked to indicate how active he or she desires to be in these activities. The responses are the same as the preceding component. Reliability data were obtained from the pilot study.

A job facet satisfaction questionnaire, containing eight items, was the fourth component (see Appendix D). The items were taken from the Job Descriptive Index (JDI) developed by Smith, Kendall, and Hulin (1969). The JDI measures attitudes associated with different aspects of a

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[1]The instrument as it was given at the facility is shown in Table 11 of Appendix F.

job. It contains five subscales, covering satisfaction with Type of Work, Pay, Promotion Opportunities, Supervision, and Coworkers. It has been widely utilized and tested for reliability (Cook, Hepworth, Wall, and Warr, 1981). In two separate studies, researchers obtained an alpha coefficient of internal reliability of 0.93 using all the items. Others have obtained alpha coefficients ranging from 0.78 to 0.84. The subscales' Spearman-Brown coefficients were reported to range from 0.80 to 0.88. The responses for this current study were summed for the four items in each facet to produce a job satisfaction score for work and coworkers.

The dependent variable of job performance was obtained from individual performance appraisal forms (Appendix E). Each member of the group is evaluated by his or her team members. The appraisal form consists of ten areas for evaluation. These include safety and hygiene, attendance, production, attitude and motivation, teamwork, quality, self-management, communication, comprehension, and openness. A composite score for job performance was generated for each team member from the most recent performance appraisal. The score was derived by adding the ten evaluated areas. The score could range from ten to fifty based on ratings of one to five for ten items. As an example, if Team Member A's ratings for each of the ten areas was 3.0, then the composite job performance score was thirty.

Pilot Study

Since the questionnaire had been created specifically for this study (except the job satisfaction component), a pilot study was conducted. However, there were no other self-directing teams similar to the sample within a reasonable distance of The University of Iowa. The best opportunity was a manufacturing facility which operates with teams but does maintain supervisors.

The procedures for administering the pilot study questionnaire were the same as those for the proposed sample (see Procedures). Data from team members at the pilot study plant were collected and studied prior to the administration of the instrument at the test facility.

Procedures

The method of administering the questionnaire and collecting the data was relatively straightforward. Over the period of three working days, volunteers from the various teams were assembled in the training room. The author handed out the individual questionnaire and explained what the study was about, how to answer the items by circling their response, how the results would be used, and answered any questions. The team members were also informed that they would receive the results through the plant manager. Since the respondents were requested to sign their name, each was assured that only the author would read and tabulate the responses. Upon completion of the

questionnaire, each individual returned it to the author for collection. The performance appraisal data were retrieved from the individual records and matched with the appropriate respondent. (See Table 12 of Appendix F for the plant results.)

Data Analysis

Except where noted, the statistical package, SAS, was used. For the variables Satisfaction with Work and Satisfaction with Coworkers (Appendix D), a sum of the four items in each facet was tabulated for an individual. A 'Yes' was three points, a '?' was one point, and a 'No' was zero points, except for the fourth item which was reverse scored. Scores could range from zero to twelve in each area of satisfaction. For Job Performance (Appendix E), a sum of the averages from the ten rated areas constituted the performance score for each team member. Scores could range from ten to fifty points. Performance averages were obtained from the most recent company performance appraisal records. The statistical program SPSS-X release 3.0 was used to obtain the reliabilities for the various components of the questionnaire since SAS does not have a readily available reliability procedure.

The next step was to develop the incompatibility score for each team member. For an individual, the absolute value of the difference between the desired involvement response (Appendix C) and the actual level of participation answer

(Appendix B) for the same activity was calculated. The difference of the corresponding items could range from zero to four. Then, a total score was computed by summing the differences for the twenty-one activities. Scores could range from zero to eighty-four. To test the first two hypotheses, a zero-order correlation was conducted between the incompatibility score, satisfaction with work, satisfaction with coworkers, and performance.

The third phase involved testing for the existence of two functional areas, specifically Administrative and Operational. A factor analysis was conducted using the responses for the actual level of participation (Appendix B). Principle components factor analysis with varimax rotation was used. In order to test for the existence of two clusters, several steps were undertaken. First, an exploratory factor analysis was conducted. Of interest were the number of clusters, Eigenvalues greater than one, and the variance by factor. Second, a factor analysis with the number of factors set at two was attempted. Those items which did not cleanly load into one factor or the other were removed and a zero-order correlation was generated. This was done to examine the relationship between the two variables. If two factors did exist, the administrative and operational variables were computed from the difference scores of its corresponding activities. Hypotheses three through six concerned the relationship between the

Administrative and Operational clusters and the dependent variables. A zero-order correlation matrix with the variables of interest was generated.

The final five propositions dealt with the moderating effect of education, tenure, age, gender, and team membership upon the relationship between the Administrative and Operational factors and the dependent variables: satisfaction with work, satisfaction with coworkers, and job performance. In order to examine these, the SAS Regression procedure was employed. The model showed that the Dependent variable is a function of the administrative/operational and Moderating variables.

The statistical procedure employed was to conduct four regressions for each moderating variable. The first regression consisted of the administrative and moderator variables. The second regression comprised the same two factors as the first generation, but also included the cross product of the moderator multiplied by the administrative variable. The third regression contained the operational factor and the same moderator; while the fourth regression included the operational variable, the same moderator, and the cross product of this twosome. For each pair of equations, regressions one with two and three with four, the R squared value was examined. Using the following equation,

$$F = \frac{(R^2(\text{of CP}) - R^2(\text{no CP}))/(\#\ \text{var(of CP)} - \#\ \text{var(no CP)})}{(1 - R^2\ (\text{of CP}))/(\text{Sample} - \#\ \text{var(of CP)} - 1)}$$

where CP was cross product (moderator*Administrative, or moderator*Operational), # var was the number of variables, and sample was 113 for the satisfaction facets and 47 for performance, an F test for significance was conducted. Each of the five moderators was tested in a similar method. The intent was to identify any outcome which has a significance of .05 or better. If any moderator did have an effect, the standardized Beta coefficients were examined for each level of the moderator to observe any trends.

As for the criticisms on the use of difference scores (see Johns, 1981, in Chapter II), pertinent data were reported. First, the reliabilities of the actual level of participation (ACTUAL) and the desired level (DESIRE) were presented. ACTUAL was computed by summing the twenty-one item responses pertaining to the actual level of participation (Appendix B) for each individual. Likewise, DESIRE was developed by summing the desired participation responses for each team member (Appendix C). Second, a zero-order correlation matrix with ACTUAL, DESIRE, the incompatibility score, the satisfaction facets, and performance was described (See Table 14 of Appendix F). Finally, correction for attenuation was conducted and cataloged in Table 13 of Appendix F.

Summary

The purpose for this study was to investigate a model

that concerns the fit between the actual and desired job activities of workers in an autonomous work group environment and its effect on satisfaction and performance. The sample used in this field research consisted of 113 employees at a Midwest manufacturing facility. The plant has used SDTs for several years. A questionnaire, developed for this study, was administered to the team members. The instrument consisted of four components. These components measured the individual team member's demographics, what activities the individual team member actually participates in, his/her desired level of involvement in these activities, and her/his satisfaction with work and coworkers. Performance appraisal evaluations were collected as a measure of job performance.

The questionnaire, tested by means of a pilot study, was distributed by the author to volunteers from the various teams during working hours. Directions and clarification of any questions improved the number of returned questionnaires. The instrument was then collected and the responses were entered in the computer for data analysis. To test the different hypotheses, various statistical techniques were used. The existence, reliabilities, correlations, and relationships of the factors were subsequently reported and are discussed in Chapters IV and V.

CHAPTER IV

DATA RESULTS

The data reported in this chapter supported the investigation of the fit between the actual and desired job activities of workers in an autonomous work group environment. Results from the pilot study, the sample, and the instruments utilized were reported. Following this information, each hypothesis was described and the statistical procedures and data outcomes were presented. Except where indicated, the Statistical Analysis System (SAS) release 5.18 was the primary statistical tool.

Pilot Study

A pilot study was conducted at a Midwest manufacturing facility which operates with teams, not autonomous work groups, and maintains supervisory positions. The questionnaire was administered on a voluntary basis to all employees during one work day (three shifts). Sample size was seventy team members. The instrument required approximately five minutes to complete. Demographic information is contained in Table 2. To obtain the reliability for each instrument, the Statistical Package for the Social Sciences (SPSS-X) release 3.0 was used. This package was used because SAS does not have a readily

Table 2: Demographic Results from the Pilot Study Sample (N = 70)

Department	Number	Percent	Gender	Number	Percent
Office	21	30.0	Female	32	45.7
Preliminary	16	22.9	Male	38	54.3
Warehouse	12	17.1			
Maintenance	11	15.7			
Shipping	1	1.4			
Other	9	12.9			

Age	Number	Percent	Shift	Number	Percent
29 or less	3	4.3	First	47	67.1
30 to 39	18	25.7	Second	12	17.1
40 to 49	29	41.4	Third	11	15.7
50 to 59	16	22.9			
60 or more	4	5.7			

Education	Number	Percent
High School or less	33	47.1
High School + add'l	34	48.6
Associate Degree	2	2.9
Bachelor's Degree	1	1.4

Tenure	Number	Percent
0 to less than 5 yr	5	7.1
5 to less than 10 yr	9	12.9
10 to less the 15 yr	9	12.9
15 yr or more	47	67.1

available reliability procedure. The component and its coefficient alpha were: Actual and Desired Participation items, 0.96; Satisfaction with Work, 0.60; and Satisfaction with Coworkers, 0.66.

To compute the Incompatibility Score for each team member, the absolute value of the difference between the desired involvement response (Appendix C) and the actual level of participation answer (Appendix B) for the same activity was calculated. The difference of the corresponding items could range from zero to four. Then, a total score was computed by summing the differences for the twenty-one activities. Scores could range from zero to eighty-four. The mean for the pilot study sample was 20.986 (s.d. 10.03). The satisfaction with work value was obtained by summing the first four items of the Job Characteristics Index (Appendix D). The mean and standard deviation were 7.143 and 3.482, respectively. Likewise, satisfaction with coworkers was summed for the last four items of Appendix D. The mean and standard deviation were 5.443 and 3.558, respectively.

A zero-order correlation was conducted with the incompatibility score, satisfaction with work and satisfaction with coworkers. The correlation coefficients and probabilities (in parentheses) were as follows:

	Incompatibility Score
Satisfaction with Work	-.12029 (0.32)
Satisfaction with Coworkers	-.21022 (0.08)

Although there were no statistically significant results,

the negative relationship between the two satisfaction variables and the incompatibility score was in the predicted direction. For the first hypothesis, the inverse correlation between these variables was postulated. Based on the results of the pilot study, the questionnaire was judged to be ready for application in the autonomous work group environment.

Sample and Instruments

The questionnaire was administered over three working days to volunteers from the various teams at the autonomous work group facility. Team members were allowed to fill out the instrument in a conference room. Most employees required five minutes to complete the items and only questions concerning clarification were asked. Performance data were obtained from personnel records of those workers which provided their names on the questionnaire. The sample size for the satisfaction components was one hundred thirteen (N = 113). There are 150 employees at this facility. The difference in the two numbers consisted of seven managers, ten employees who partially completed the instrument, and those team members with time off or who were unable to leave their work station. The number of team members for which performance appraisal data could be obtained was forty-seven (N = 47). The low number of performance scores was due to the lack of team members supplying their names on their questionnaires. Demographic

information is contained in Table 3. To obtain the reliability for each instrument, the Statistical Package for the Social Sciences (SPSS-X) release 3.0 was again used. The component and its coefficient alpha were: Actual and Desired Participation items, 0.94; Satisfaction with Work, 0.65; and Satisfaction with Coworkers, 0.77.

The next step was to develop the incompatibility score for each team member. For each individual, the absolute value of the difference between the desired involvement response (Appendix C) and the actual level of participation answer (Appendix B) for the same activity was calculated. The difference of the corresponding items could range from zero to four. Then, a total score was computed by summing the differences for the twenty-one activities. Scores could range from zero to eighty-four. The mean for the sample was 19.434 (s.d. 10.65).

The satisfaction with work value was obtained by summing the four items for each individual. A 'Yes' was three points, a '?' was one point, and a 'No' was zero points, except for the fourth item which was reverse scored. Scores could range from zero to twelve. The mean and standard deviation were 7.805 and 3.625, respectively. Likewise, satisfaction with coworkers was summed for its four items. The scores could range from zero to twelve. The mean and standard deviation were 7.177 and 3.989, respectively. For Job Performance (Appendix E), the sum of

Table 3: Demographic Results from the Sample (N = 113)

Team	Number	Percent	Gender	Number	Percent
Z Production	17	15.0	Female	34	30.1
A Production	22	19.5	Male	79	69.9
B Production	20	17.7			
C Production	20	17.7			
Shipping	4	3.5			
Maintenance	7	6.2			
Office	22	19.5			
Other	1	0.9			

Age	Number	Percent
29 or less	23	20.4
30 to 39	49	43.4
40 to 49	29	25.7
50 to 59	7	6.2
60 or more	5	4.4

Education	Number	Percent
High School or less	45	39.8
High School + add'l	55	48.7
Associate Degree	6	5.3
Bachelor's Degree	5	4.4
Graduate Courses	2	1.8

Tenure	Number	Percent
0 to less than 4 yr	32	28.3
4 to less than 8 yr	33	29.2
8 to less the 12 yr	15	13.3
12 yr or more	33	29.2

the ten rated areas constituted the performance score for each team member. Scores could range from ten to fifty points. Performance averages were obtained from the most recent company performance appraisal records. The mean and

standard deviation for the sample of forty-seven were 32.553 and 2.254.

Hypotheses Outcomes

This section reiterates each of the hypotheses along with the pertinent data, the statistical procedures, and outcomes.[1] The first step was to perform a zero-order correlation with the incompatibility score (INCOMP), satisfaction with work (WOSAT), satisfaction with coworkers (COWOSAT), and performance (PERF). The results are listed in Table 4. The incompatibility score was negatively correlated to the three outcome variables; however, only WOSAT and COWOSAT were significantly related to INCOMP. Hypothesis one: The higher the incompatibility score, the lower the satisfaction with work and coworkers. From Table 4, WOSAT and COWOSAT were negatively and significantly correlated with INCOMP. This supported the first hypothesis. Hypothesis two: The higher the incompatibility score, the lower the job performance. Table 4 indicates an inverse relationship; however, it is not statistically significant.

Hypotheses three, four, five, and six concerned the clustering of activities in an autonomous work group environment. The twenty-one activities which investigated the team member's actual level of participation (Appendix B)

[1]The data with respect to Johns' (1981) criticisms of difference scores is contained in Appendices J and K.

Table 4: Zero-order Correlation with Incompatibility Score, Satisfaction with Work, Satisfaction with Coworkers, and Performance

	INCOMP	WOSAT	COWOSAT	PERF[a]
INCOMP	1.000	-0.207*	-0.280**	-0.160
WOSAT		1.000	0.527***	0.030
COWOSAT			1.000	0.150
PERF				1.000

[a]N = 47
* p < .05; ** p < .01; *** p < .001

were used for factor analysis. The statistical technique involved a principal components analysis with a varimax rotation. First, an exploratory factor analysis was performed. The results of the four-factor solution are contained in Table 9 of Appendix F. Secondly, the computer was directed to set the number of factors at two. This was done in order to examine the closeness of the two computer-generated factors and the proposed Administrative and Operational variables. Table 5 lists the item clustering under two primary factors. The computer-generated solution was very similar to the proposed breakdown except for compensation, work scheduling, and five activities which did not cleanly load in one factor or the other. The five

Table 5: Two-Factor Solution of the Principal Components Factor Analysis with Varimax Rotation of the Twenty-one Activities

Item	Activity	Factor 1	Factor 2
A1	Discipline	0.75359	0.08276
A2	Training	0.56387	0.27022
A3	Performance	0.86867	0.02488
A4	Hiring	0.75465	0.13988
A5	Work rules	0.39765	0.55690
A6	Work space	0.06830	0.60581
A7	Feedback(mgmt)	0.27962	0.57003
A8	Safety	0.33697	0.53267
A9	Work schedule	0.46267	0.49042
A10	Team leader	0.72863	-0.04970
A11	Team meetings	0.51755	0.51350
A12	Team goals	0.54752	0.45857
A13	Team decisions	0.57630	0.57465
A14	Materials	-0.20505	0.73243
A15	Quality	0.22971	0.48848
A16	Job rotation	0.72044	0.16718
A17	Customers	-0.08894	0.61876
A18	Housekeeping	0.20104	0.56911
A19	Maintenance	0.00129	0.55460
A20	Compensation	0.24898	0.54766
A21	Feedback(team)	0.22378	0.45760
EIGENVALUES:		7.238	2.505

items, Work space, Work schedule, Team meetings, Team goals, and Team decisions, were eliminated from the factors. Next, the factors administrative (ADMIN) and operational (OPERL) were computed by summing the six and ten clustered items, respectively. A zero-order correlation analysis was conducted for the two factors. They were positively and significantly correlated (0.38, $p < 0.0001$). The means and standard deviations for the variables ADMIN and OPERL were

16.575 (5.786) and 24.708 (6.429), respectively. Additionally, the reliability (coefficient alpha) for ADMIN was 0.89 and OPERL was 0.89.

Based upon the information presented, the existence of two factors needed to be determined. Closer examination argued for only one factor instead of two. A zero-order correlation indicated a positively correlated pair of clusters ($R = .38$, $p < 0.0001$). The reliability of the overall questionnaire was very high (0.94) and each factor had a similar reliability (ADMIN = 0.89; OPERL = 0.89). Also, the Eigenvalue for the first grouping was 7.24 with a reduction to 2.51 for the second cluster. The exploratory factor analysis which resulted in a four-factor solution had similar results. Computation of ADMIN and OPERL variables using difference scores (six items for ADMIN and ten items for OPERL) yielded a zero-order correlation of .63 ($p < .0001$). Based on these considerations, there was only one cluster or variable which contained all of the activities. This makes intuitive sense due to the fact that the team is responsible for a set of activities, all performed by the team members. Breaking down the activities into two groups was not advantageous. Since one factor was derived, the testing of hypotheses three, four, five, and six was not feasible.

The final five propositions dealt with the moderating effect of education, tenure, age, gender, and team

membership upon the relationship between the administrative and operational factors and the dependent variables: satisfaction with work, satisfaction with coworkers, and job performance. Due to the actuality of only one factor, the SAS regress model depicted was

WOSAT, COWOSAT, PERF = f{INCOMP, MODERATOR}

where the dependent variables satisfaction with work, satisfaction with coworkers, and performance were a function of the incompatibility score and each of the five moderators.

The statistical procedure employed was to conduct two regressions for each moderating variable. The first regression consisted of INCOMP and the moderator. The second regression comprised the same two factors as the first generation, but also included the cross product of the moderator multiplied by INCOMP. For both equations, the R squared value was examined. Using the following equation,

$$F = \frac{(R^2(\text{of CP}) - R^2(\text{no CP}))/(\#\ \text{var(of CP)} - \#\ \text{var(no CP)})}{(1 - R^2\ (\text{of CP}))/(\text{Sample} - \#\ \text{var(of CP)} - 1)}$$

where CP was the cross product of INCOMP*moderator, # var was the number of variables, and sample was 113 for WOSAT and COWOSAT and 47 for PERF, an F test for significance was conducted. Tables 6, 7, and 8 present the R^2 results and Beta coefficients for the hierarchical regression analyses

Table 6: Hierarchical Regression Analyses of Incompatibility, Moderators, and Their Interaction with Satisfaction with Work

Step	Variable	Total R2	Increase of R2	Beta
1.	Incompatibility (INCOMP)	.043	.043	-.207
2.	Moderators			
	Gender (GD)	.085	.042	-.165
	Age (AG)	.072	.029	-.205
	Education (ED)	.044	.001	-.210
	Tenure (TN)	.118	.075	-.238
	Team (TE)	.232	.189	-.184
3.	Incompatibility-Moderator Interaction			
	INCOMP*GD	.089	.004	-.119
	INCOMP*AG	.114*	.042	.086
	INCOMP*ED	.060	.016	-.261
	INCOMP*TN	.152*	.034	-.041
	INCOMP*TE	.259	.027	-.270

N = 113

* Indicates significance of change in F with the addition of the moderator, $p < .05$.

Table 7: Hierarchical Regression Analyses of Incompatibility, Moderators, and Their Interaction with Satisfaction with Coworkers

Step	Variable	Total R2	Increase of R2	Beta
1.	Incompatibility (INCOMP)	.078	.078	-.280
2.	Moderators			
	Gender (GD)	.084	.006	-.265
	Age (AG)	.085	.007	-.279
	Education (ED)	.079	.001	-.281
	Tenure (TN)	.186	.108	-.317
	Team (TE)	.194	.116	-.251
3.	Incompatibility-Moderator Interaction			
	INCOMP*GD	.113	.029	-.145
	INCOMP*AG	.109	.019	-.064
	INCOMP*ED	.094	.015	-.419
	INCOMP*TN	.232*	.046	-.086
	INCOMP*TE	.229	.035	-.265

N = 113

* Indicates significance of change in F with the addition of the moderator, $p < .025$.

Table 8: Hierarchical Regression Analyses of Incompatibility, Moderators, and Their Interaction with Performance

Step	Variable	Total R2	Increase of R2	Beta
1.	Incompatibility (INCOMP)	.026	.026	-.160
2.	Moderators			
	Gender (GD)	.026	.000	-.152
	Age (AG)	.036	.010	-.171
	Education (ED)	.049	.023	-.160
	Tenure (TN)	.051	.025	-.170
	Team (TE)	.099	.073	-.217
3.	Incompatibility-Moderator Interaction			
	INCOMP*GD	.036	.010	-.203
	INCOMP*AG	.040	.004	-.107
	INCOMP*ED	.050	.001	-.176
	INCOMP*TN	.053	.002	-.126
	INCOMP*TE	.100	.001	-.140

N = 47

of incompatibility, moderators, and their interaction with satisfaction with work, satisfaction with coworkers, and performance, respectively. Table 10 of Appendix F contains the means and standard deviations for the variables PERF, WOSAT, COWOSAT, and INCOMP sorted by gender, age, tenure, education, and team membership.

Hypothesis seven: Education will moderate the relationship between the Administrative/Operational activities and satisfaction with work, satisfaction with coworkers, and performance. Education was not statistically significant in its effect on satisfaction with workers, satisfaction with coworkers, or performance.

Hypothesis eight: Tenure will moderate the relationship between the Administrative/Operational activities and satisfaction with work, satisfaction with coworkers, and performance. Tenure was influential on satisfaction with work and with coworkers.

Hypothesis nine: Age will moderate the relationship between the Administrative/Operational activities and satisfaction with work, satisfaction with coworkers, and performance. From the table, age had an effect on satisfaction with work.

Hypothesis ten: Gender will moderate the relationship between the Administrative/Operational activities and satisfaction with work, satisfaction with coworkers, and performance. Gender was not significant in any of the

relationships.

Hypothesis eleven: Team membership will moderate the relationship between the Administrative/Operational activities and satisfaction with work, satisfaction with coworkers, and performance. There were no significant relationships using team membership as a moderating variable.

Summary

From the data presented, there was support for examining the fit between the actual and desired job activities of workers in an autonomous work group environment. Results from the pilot study indicated a high reliability for the instrument and provided feedback that enabled proceeding with the study. The questionnaire was administered at the test site with no problems and a sample response of 113 team members was elicited. The reliability obtained was very similar to the pilot study. Several of the hypotheses were supported.

There was a statistically significant correlation between the incompatibility score of a team member and his or her level of satisfaction with work and with coworkers. No relationship was discovered with the measure of performance. When factor analyzed, only one factor stands out. As for the five moderating variables, it was found that age affected the relationship between the

incompatibility score and satisfaction with work. Tenure was found to influence the connection between the incompatibility score and both satisfaction with work and with coworkers. Specific explanations of these results are presented in Chapter V.

CHAPTER V

SUMMARY AND CONCLUSIONS

The purpose of this study was to investigate the fit between the actual and desired job activities of workers in an autonomous work group environment. The foundation and plan were presented in Chapter I. The literature was reviewed in Chapter II. Chapters III and IV reported on the study design, data collection, analysis, and results. This chapter summarizes the findings and completes the examination. The summary includes an evaluation of the theoretical components, the practical applications, changes to the instruments, and direction for future studies.

Theoretical Components

The theoretical groundwork was directed at combining two different theories, namely sociotechnical systems and role conflict. Sociotechnical systems theory attempts to structure the social and technical parts of work into a jointly optimized work system via autonomous work groups. These types of groups are responsible for a whole product or process, with discretion to decide what tasks and activities are necessary to accomplish their goals. Team members are required to possess many different skills and perform various tasks.

Role conflict, specifically person/role conflict, was important because it consists of the clash between the expectations which the role makes with a set of expectations the employee makes on him or herself. Some team members want to participate in more activities while others want to do less. Findings in this study on the incongruency between actual and desired levels of participation were similar to previous investigations of role conflict (Kahn et al., 1964). Specifically, the more conflicting the two levels of participation, the less the team member was satisfied with his or her work and coworkers. Based on the statistical results, the model (Figure 1) was applicable to team members in an autonomous work group environment. In the following paragraphs, the results are explained in more detail.

Hypothesis one stated that the higher the incompatibility score, the lower the satisfaction with work and coworkers. The results of this study indicated a statistically significant inverse correlation between the incompatibility score and the levels of satisfaction. The more incongruent the relationship between the actual level of participation and the desired level of activity, the less satisfied the team member. The significant effect of autonomous work groups on satisfaction was commensurate with previous studies (Wall and Clegg, 1981; Kemp, Wall, Clegg, and Cordery, 1983; Wall, Kemp, Jackson, and Clegg, 1986; Rao, Thornberry, and Weintraub, 1987; Pearce and Ravlin,

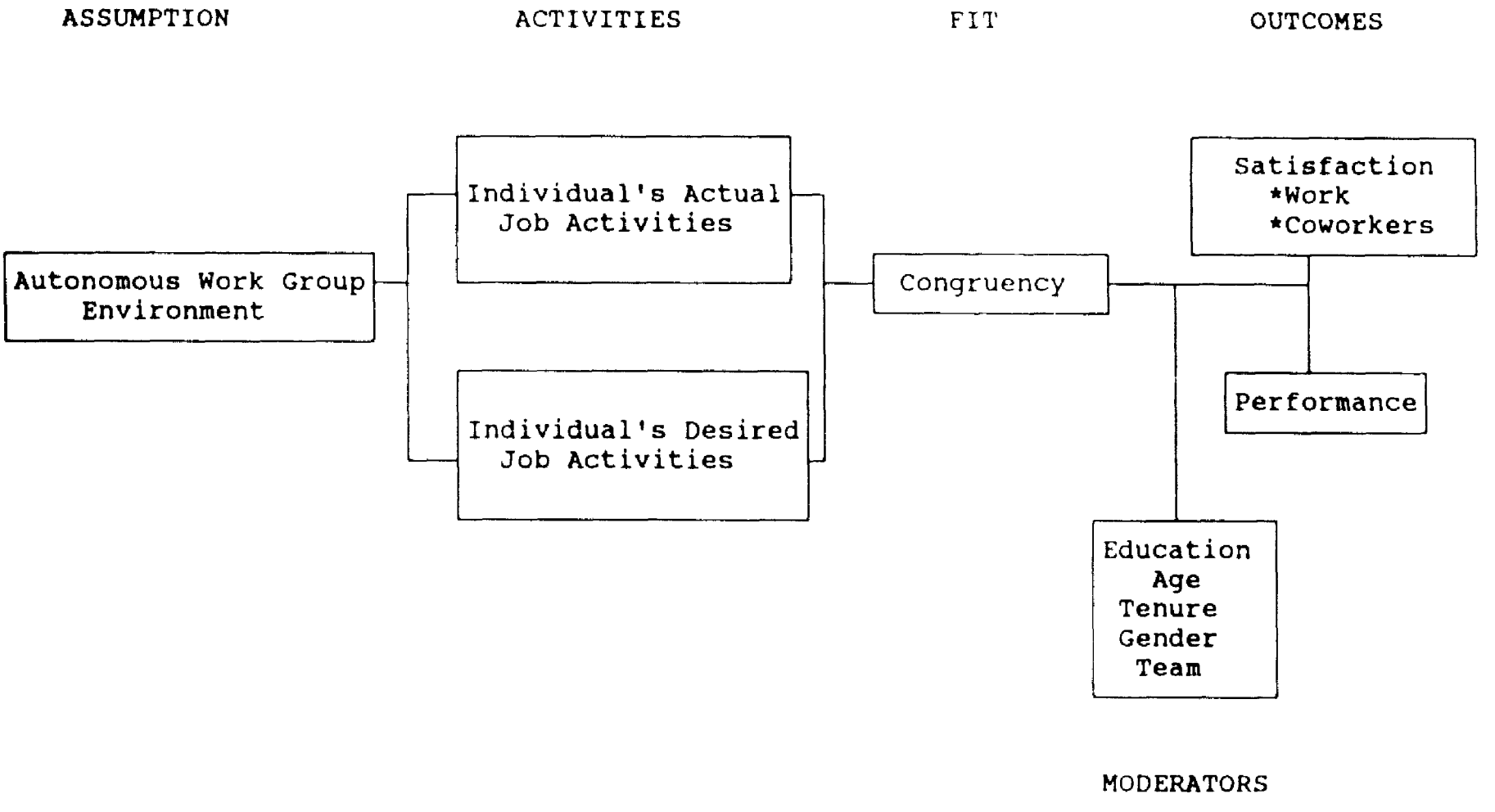


Figure 3: Corrected Congruency Model

1987; Goodman, Devadas, and Hughson, 1988).

The second hypothesis, the higher the incompatibility score, the lower the job performance, resulted in a negative correlation but was not statistically significant. There were two possible reasons for this phenomenon. First, each respondent was asked to print her or his name on the questionnaire. Forty-seven team members signed their name; therefore, only a small number of performance appraisals were inspected. The other reason was revealed by the plant manager. On the appraisal forms, any time a team member is rated a '1' or '5' by a fellow team member, the fellow member must write a short synopsis of why the individual was rated this way. More times than not, team members typically rate others as a '3' to avoid having to make special comments. The restriction of range created by this rating technique affected the correlation coefficient between the incompatibility score and job performance.

Hypotheses three through six were concerned with a two-factor breakdown of the activities performed by autonomous work groups (Table 1). However, closer examination argued for only one factor instead of two. A zero-order correlation of the actual items (computed by summing the twenty-one actual activities responses for each individual) and the desired items (computed by summing the twenty-one desired activities responses) indicated a positive and significant correlation ($R = .58$, $p < 0.0001$). The

reliability of the actual and desired items was 0.90 and 0.92, respectively. The reliability of the overall questionnaire was also very high, 0.94. An exploratory factor analysis revealed four clusters (See Table 9 of Appendix F). When directing the computer to set the number of factors at two, five activities did not cleanly load on either cluster. The activities were Work space, Work schedule, Team meetings, Team goals, and Team decisions. Using the items which did cluster (ADMIN had six and OPERL had ten), the reliability of each variable was 0.89 for both. Also, the first Eigenvalue for the two- and four-factor solutions was 7.24 with a reduction to 2.51 for the second cluster. Computation of an ADMIN and OPERL variable using difference scores (six items for ADMIN and ten items for OPERL) yielded a zero-order correlation of 0.63 ($p < .0001$). Based on these considerations, there was only one cluster or variable which contained all of the activities. This conclusion has merit due to the fact that the team is responsible for a set of activities, all performed by the team members. It would appear that breaking down the activities into two groups was not practical. Since one factor was derived, the testing of hypotheses three, four, five, and six was not feasible.

The seventh hypothesis dealt with the influence of education on the independent (incompatibility) and the dependent variables (satisfaction with work, satisfaction

with coworkers, and job performance). It was not statistically associated with any of the outcome measures. This could have been due to the skewed data because eighty-nine percent of the respondents were in the first two categories (high school or less and high school plus additional courses).

The eighth hypothesis involved tenure and its interaction on the relationship between the incompatibility score and the outcome measures. There was a statistically significant effect for satisfaction with work and coworkers but not with job performance. The F test for significance was 4.3 ($p < .05$) for WOSAT and 6.55 ($p < .025$) for COWOSAT. The standardized Betas for satisfaction with work went from a negative value of -.076 at the first level of tenure (0 to less then 4 years) to a -0.836 for the most tenured level (12 years or more). Likewise, Beta coefficients for satisfaction with coworkers went from 0.005 at the first level to -0.71 at the highest level. As the number of years of service went up, the incongruence between the actual and desired levels of participation also increased, affecting the team member's satisfaction with work and coworkers. He or she was not being allowed to participate in many of the activities; therefore, dissatisfaction with the job and peers intensified.

Age and its interaction were considered in hypothesis nine. Significant results were obtained only in the

moderation of the incompatibility score and satisfaction with work. The F test for significance was 5.24 ($p < .05$). The Beta coefficients went from -0.144 at the youngest level (29 years or less) to 0.293 for the 40 to 49 years level. No Beta coefficients were available for the 50 to 59 and 60 or more years levels. There was a higher degree of incongruency between the actual and desired levels of participation for the younger team member. This supported the concept that the younger worker desired more participation in the activities that affect her or his work. Older team members, due to many years of work experience and work settings, were more content with their level of participation in an autonomous work group environment.

Hypothesis ten concerned the influence of gender. The moderator, gender, was not significant in any of the relationships. Hypothesis eleven was concerned with the interaction effect of team membership upon the relationship between the incompatibility score and the dependent variables. The regression results did not result in a significant outcome.

To summarize, the incompatibility score was a good measure of the congruency between the levels of actual and desired participation in an autonomous work group environment. The higher the score, the lower the satisfaction with work and with coworkers. No association was found with performance due to the small sample size and

the method of rating team members. There was justification for not breaking the incompatibility score into components of administrative and operational items. Finally, the moderators age and tenure had a definite interaction effect on the relationship between the incompatibility scores and satisfaction with work. Tenure affected the connection between incompatibility and satisfaction with coworkers.

Practical Applications

The practical application of this research covers several areas. The first is using the instrument as an evaluation tool of self-directed or other types of teams. The instrument could be administered in an autonomous work group environment or in a facility about to engage in self-managing work groups. The results would provide a data baseline to evaluate the progress of development. A comparison of the actual responses with the desired answers would indicate which activities need attention and those that are adequate. For example, if the mean of the item which measures actual contact with customers was low but the mean which measures the desired level was much higher, an investigation as to the discrepancy would be necessary.

A second application of this instrument is evaluating the climate of the organization and the level of expectations of the new team members. Quite often when autonomous work groups are installed, the employees develop the philosophy that they are in charge and no longer need

management. The level of their expectations is very high initially. After working in this type of environment for a period of time, these expectations may not have been met. The instrument could be used to tap the incompatibility between what the team members were actually doing and how much more they desired to control or participate in the activities. This would also examine the climate of the organization by measuring the levels of satisfaction with work and coworkers due to the effect of unmet expectations.

The same evaluation process lends itself to the development of training, the third application. If the mean of the item which measured the actual level of participation for performance appraisal was low but the mean of the item which measured the desired level was high, some training would be required in the techniques of conducting appraisals. Also, if the team members indicated a strong desire to be part of the hiring process, it would be necessary to train them in selection procedures. Those items which have a large difference could be indicators for problems and areas of possible training.

The outcomes of this study are important to managers and team members in autonomous work group environments. Incongruency between the actual and desired activities is directly related to lower satisfaction with work and coworkers. The instrument could be used to identify specific problem areas for management and team members to

correct in order to improve these facets of satisfaction.

Managers and team members should also be cognizant of the dissatisfaction among the more tenured team members and the younger employees. The young workers may enter the autonomous work group environment with high desires to participate in the decisions that affect them. Without instilling realistic expectations, dissatisfaction and possibly poor performance would develop. Team members with many years of service in an autonomous work group environment may also desire more participation. They have worked in the system for many years and faced most of the problems. Restricting their input in the many activities performed by the teams would be a waste of experience and talent. Dissatisfaction and possibly losing the tenured employee would remove a valuable source of knowledge for the team (See Table 12 of Appendix F).

Finally, the list of activities used in the present study are a good beginning to understanding the types of tasks performed by autonomous work groups. Companies transitioning to a self-directed team environment could start with this list and decide which of the activities could be immediately transferred to the teams and which need special attention before being turned over. Examples of activities which could be immediately relinquished to the teams include arranging the physical work space, determining when team meetings will be held, and rotating jobs. The

activities of hiring, performance appraisal, and compensation require special training before the team members are competent in these areas.

Since one company supplied the use of its team members, there are practical applications which are specific to that plant. Table 12 of Appendix F contains the averages for the actual and desired responses from this study. Feedback was supplied to the managers and team members. However, disclosure of the recommendations and feedback was considered inappropriate for inclusion in this research study.

Changes to the Study

Although the instrument provided important data, there are some changes that should be made before it is used in the future. First, a better method is required to record performance information. Requesting an individual to sign his or her name is not feasible. Additionally, there tended to be no individual measures of performance in a team environment other than the performance evaluation. A different technique may be necessary, such as actual performance data of the team or team coordinator evaluations of the team members. Second, a better satisfaction questionnaire is necessary. Based upon responses and interviews, the current satisfaction with work and coworkers items appeared to be designed for an individual in a specific job. It may not be appropriate for a team

environment. For example, item one states, "Work on my present job is fascinating" (See Appendix D). Since team members perform many activities, which is considered their present job? Additionally, one of the most often asked questions of this researcher was, "Why isn't there a 'sometimes' for the responses?" Based on the lower than desired reliabilities and the team members' feedback, a satisfaction questionnaire specifically designed for team members is necessary.

There are several possible changes for the activities questionnaire (Appendices B and C). Since self-directed team members can be representatives on many different teams, the instructions should include a statement about participation in some of the activities performed "in your primary team." For example, a Team Z person could belong to the plant training team and the safety committee. The responses should be based upon their membership in Team Z, not the other associations.

Several activities need to be clarified. Item nine, which dealt with work scheduling, should be rewritten to specify whether it was the individual's, another team member's, or the plant's work schedule. There were some inquiries as to which was requested. Discussing problems or suggestions with customers, item seventeen, needs differentiation. One item should indicate discussion with internal customers (other teams, labs, departments, etc.)

and another discussion with external customers (suppliers, vendors, etc.). Phrasing this way would eliminate item twenty-one, which was providing feedback to other teams. Finally, item twenty, which concerns compensation decisions, should be divided into two items. The first would indicate participation in direct compensation (base pay, merit pay, incentives, COLAs) and the second item would inquire about participation in compensation decisions which concern employee services, protection programs, and time away from work (Milkovich and Newman, 1987). These changes would enhance the already reliable questionnaire.

Future Studies

It should be noted that this was a case study of one plant that functions with self-directed teams. It has operated in this capacity for more than eight years. Future studies should involve more facilities operating in an autonomous work group environment and follow several different paths. First, the incongruency between actual and desired activities and its relationship with performance should be investigated. In this study, the reluctance of employees to sign their names resulted in the small sample size. This contributed to the lack of a significant finding between the incompatibility score and performance. In order to accomplish this, a better method for evaluating performance is required. It is still hypothesized that a high incompatibility score will correlate to lower

performance.

A second path concerns the introduction of more moderating variables. More research should be conducted on the influence of tenure, gender, education, and age. Similar findings of their effects in other self-directing teams would validate the outcomes of this current study. It is also suggested that team membership will influence a team member to such a degree as to affect his or her level of satisfaction and performance. Due to statistical problems, no conclusion was obtained in this study. Another important factor concerns team leadership. If the team member has been a team leader, she or he has experienced an increased level of participation. What happens when the member returns to the regular team status? Is he or she allowed more input or does he/she just act like the rest of the team? It is hypothesized that having been a team leader will influence the relationship between the incompatibility score and satisfaction and performance.

A final direction concerns the questionnaire itself. Since autonomous work groups perform many different activities, the instrument should include these general work procedures. The questionnaire in this study, although not all encompassing, did establish a baseline for the study of self-directed teams. There may be other general functions performed that should be incorporated. Two such activities that may be added are participation in developing budgets

and establishing production goals (Wellins, Wilson, Katz, Laughlin, Day, and Price, 1990). Future research can identify other possible activities to be included.

Summary

Since business leaders are directing their attention to self-directed teams, it was important to identify dimensions and characteristics of these work groups. This study has investigated the effect of congruency between the actual and desired job activities within an autonomous work group environment. From activities reported in the literature, a questionnaire was developed to measure the difference between the actual level of participation and the desired degree of input. Once this difference or incompatibility score was determined, it was compared to the team member's satisfaction and performance. A statistically significant and negative correlation was obtained between the incompatibility score and satisfaction with work and coworkers. No relationship was identified for the link to performance.

As for moderating variables, there were also significant results. Age and tenure were found to have a moderating effect on the relationship between the incompatibility score and the satisfaction facets. Gender and education did not present any significant findings. Team membership did not impart an effect due to statistical problems with the study. Several changes were suggested to

improve the instrument, the practicality of the instrument was discussed, and the direction for future studies was examined. Incongruency between the actual and desired levels of participation in activities performed by autonomous work group members does affect satisfaction with work and coworkers. Elimination of the incompatibility will benefit both managers and teams.

APPENDIX A

DEMOGRAPHIC INFORMATION

The following personal information was collected from each team member:

Name

Gender
- Male
- Female

Age
- 29 or less
- 30 to 39
- 40 to 49
- 50 to 59
- 60 or more

Education
- High School or less
- High School plus additional courses
- Associate Degree
- Bachelor's Degree
- Graduate Courses

Team Name
- Z Production
- A Production
- B Production
- C Production
- Shipping
- Maintenance
- Office

Years at Plant
- 0 to less than 4 years
- 4 to less than 8 years
- 8 to less than 12 years
- 12 years or more

Team Coordinator
- Yes
- No

APPENDIX B

INDIVIDUAL TEAM MEMBER'S ACTUAL JOB ACTIVITIES

Responses to the twenty-one items are based on the following scale:

1	2	3	4	5
Not at All	Very Little	Some	Quite a Bit	A Very Great Deal

1. Within the team concept at the plant, I participate in disciplining a team member when necessary.

2. Within the team concept at the plant, I participate in training other team members.

3. Within the team concept at the plant, I participate in evaluating a team member's performance.

4. Within the team concept at the plant, I participate in hiring a new team member.

5. Within the team concept at the plant, I participate in establishing company work rules or policies.

6. Within the team concept at the plant, I participate in arranging the physical work space.

7. Within the team concept at the plant, I participate in providing feedback to management.

8. Within the team concept at the plant, I participate in identifying safety issues.

9. Within the team concept at the plant, I participate in the work scheduling (vacation, overtime, time off).

10. Within the team concept at the plant, I participate in selecting a new team leader.

11. Within the team concept at the plant, I participate in determining when team meetings will be held.

12. Within the team concept at the plant, I participate in setting team goals.

13. Within the team concept at the plant, I participate in making decisions that will affect the team.

14. Within the team concept at the plant, I participate in ordering materials.

15. Within the team concept at the plant, I participate in identifying quality control issues.

16. Within the team concept at the plant, I participate in the rotation of jobs within the team.

17. Within the team concept at the plant, I participate in discussing problems or suggestions with customers.

18. Within the team concept at the plant, I participate in the housekeeping practices.

19. Within the team concept at the plant, I participate in maintaining the machinery in the work area.

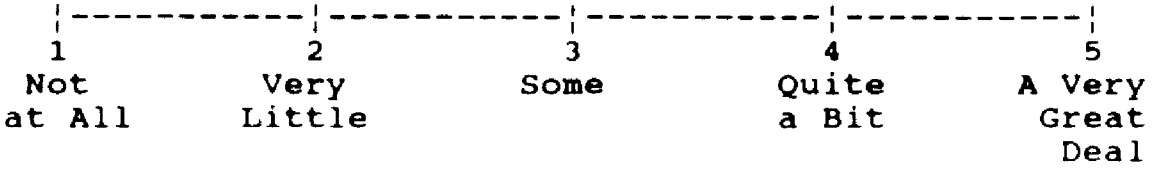
20. Within the team concept at the plant, I participate in compensation decisions.

21. Within the team concept at the plant, I participate in providing feedback to other teams.

APPENDIX C

INDIVIDUAL TEAM MEMBER'S DESIRED JOB ACTIVITIES

Responses to the twenty-one items are based on the following scale:



1. Within the team concept at the plant, how active do I want to be with disciplining a team member when necessary?

2. Within the team concept at the plant, how active do I want to be with training other team members?

3. Within the team concept at the plant, how active do I want to be with evaluating a team member's performance?

4. Within the team concept at the plant, how active do I want to be with hiring a new team member?

5. Within the team concept at the plant, how active do I want to be with establishing company work rules or policies?

6. Within the team concept at the plant, how active do I want to be with arranging the physical work space?

7. Within the team concept at the plant, how active do I want to be with providing feedback to management?

8. Within the team concept at the plant, how active do I want to be with identifying safety issues?

9. Within the team concept at the plant, how active do I want to be with work scheduling (vacation, overtime, time off)?

10. Within the team concept at the plant, how active do I want to be with selecting a new team leader?

11. Within the team concept at the plant, how active do I want to be with determining when team meetings will be held?

12. Within the team concept at the plant, how active do I want to be with setting team goals?

13. Within the team concept at the plant, how active do I want to be with making decisions that will affect the team?

14. Within the team concept at the plant, how active do I want to be with ordering materials?

15. Within the team concept at the plant, how active do I want to be with identifying quality control issues?

16. Within the team concept at the plant, how active do I want to be with the rotation of jobs within the team?

17. Within the team concept at the plant, how active do I want to be with discussing problems or suggestions with customers?

18. Within the team concept at the plant, how active do I want to be with the housekeeping practices?

19. Within the team concept at the plant, how active do I want to be with maintaining the machinery in the work area?

20. Within the team concept at the plant, how active do I want to be with compensation decisions?

21. Within the team concept at the plant, how active do I want to be with providing feedback to other teams?

APPENDIX D

JOB FACET SATISFACTION QUESTIONNAIRE

The eight items are scored by requiring the respondents to put a "Y" beside each item if it describes the feature in question, an "N" if the item does not describe that feature, or a "?" if they cannot decide. A "Y" is worth 3, an "N" is 0, and a "?" is worth 1.

1. Work on my present job is fascinating.

2. Work on my present job is challenging.

3. Work on my present job gives me a sense of accomplishment.

4. Work on my present job is frustrating. (reverse scoring)

5. People on my present job are stimulating.

6. People on my present job are responsible.

7. People on my present job are loyal to the team.

8. It is easy to make enemies with the people on my present job. (reverse scoring)

Work Subscale - items 1,2,3,4

Coworkers Subscale - items 5,6,7,8

Source: Smith, Kendall, and Hulin (1969)

APPENDIX E

MIDWEST MANUFACTURING COMPANY'S PERFORMANCE APPRAISAL FORM

Explanation of Appraisal Form

There are ten personnel performance rated areas. They are Safety and Hygiene, Attendance, Production, Attitude and Motivation, Teamwork, Self-Management, Communications, Comprehension, Openness, and Quality. Each team member is evaluated by his or her team. From these evaluations, an average is determined for each of the ten areas, which then determines the individual's rating (rounded up or down). The following rating scale is to help convert the averages from this form to the test site's form.

1 = 1.00 to 1.49	3+ = 3.20 to 3.49
2 = 1.50 to 2.49	4 = 3.50 to 4.49
3- = 2.50 to 2.79	5 = 4.50 to 5.00
3 = 2.80 to 3.19	

As an example, Safety and Hygiene has six items. If the person receives a 3, 4, 4, 2, 4, 3, then the average is 3.33 and the rating is 3+. Each team member's performance is rated using this format. A rating of "5" is high while a rating of "1" is low.

Safety and Hygiene -- Consider each area individually and rate your peer from 1 to 5.

5 4 3 2 1 A. Operates equipment according to safety and health standards and always works safely.

5 4 3 2 1 B. Informs others immediately of basic safety violations; always in a positive manner. Turns in unsafe acts cards.

5 4 3 2 1 C. Wears all required personal protective equipment, including hard hat when unloading reels.

5 4 3 2 1 D. Observes and follows caution labeling on containers and caution signs on equipment.

5 4 3 2 1 E. Checks all required tools, equipment or machinery prior to use, i.e. pads on ladders, e-stops, trailer jacks, forklift dock locks.

5 4 3 2 1 F. 1 = 1 or more lost-time accidents or 4-5 incidents.
2 = zero lost-time accidents or 2-3 incidents.
3 = zero lost-time accidents or 0-1 incidents.
4 = zero lost-time accidents and zero incidents.
5 = same requirements as #4 plus is an active member of the safety committee or is a certified CPR, First-aid Trainer or is a member of the Fire Brigade.

Attendance -- The following rating must be derived from the team's attendance records. Must be evaluated over a one year period or since hire date, whichever is less.

5 = No days missed and no tardys.

4 = 1 sick day or 1 tardy.

3 = 2 sick days or 2 tardys.

2 = 3-4 sick days or 3 or more tardys.

1 = 5 or more sick days or tardys.

Production -- Consider each area individually and rate your peer from 1 to 5.

5 4 3 2 1 A. Makes a genuine effort to contribute to team's productivity.

5 4 3 2 1 B. Makes efficient use of time.

5 4 3 2 1 C. Utilization of skills and talents to enhance a high level of productivity.

5 4 3 2 1 D. Works in an organized manner.

5 4 3 2 1 E. Makes an extra effort to conform to good housekeeping practices.

5 4 3 2 1 F. Paperwork is complete and correct.

Attitude & Motivation -- Consider the description of each rating.

1) Attitude — A team member that displays a negative attitude toward team, plant, and the organization. Always acts unconcerned or disinterested in achieving outlined goals and objectives. Can best be characterized as a disgruntled or disenchanted employee.

Motivation — A team member that displays little initiative and requires constant guidance. The employee's low motivational level results in an unsatisfactory performance. Progressive discipline steps will have to be taken in an attempt to correct this situation.

2) Attitude — A team member with an attitude that frequently changes from a progressive to a regressive attitude on a daily basis. The employee attempts to ignore the teamwork principle and continually downgrades the Self-Directed concept.

Motivation — A team member that is often concerned about matters other than work and rarely shows any initiative or drive. This person is difficult to motivate and production usually suffers. Improvement is essential.

3) Attitude — A team member that consistently demonstrates a sound productive attitude. Employee that does his or her part in making the team,

plant, and organization a total success. Rarely complains, is willing to accept or volunteer for all/any duties or assignments.

Motivation — A team member that has good initiative, keeps busy, and works at a steady pace.

4) Attitude & Motivation — A team member with an excellent attitude and motivational level. Always makes self available and seeks involvement to constantly improve team. This employee is participative, goal-oriented, and very resourceful.

5) Attitude & Motivation — A team member with an outstanding attitude and motivational level. An employee that influences others in a positive fashion and sets an exceptional example for the rest of the team.

Teamwork -- Consider each area individually and rate your peer from 1 to 5.

5 4 3 2 1 A. Contributes toward the accomplishment of plant goals and objectives.

5 4 3 2 1 B. Readily volunteers to become actively involved in serving team and plant requirement.

5 4 3 2 1 C. Encourages co-workers to attain their full potential.

5 4 3 2 1 D. Helps others willingly when circumstances permit.

5 4 3 2 1 E. Supportive and involved in the training process.

5 4 3 2 1 F. Supportive and involved in the evaluation process.

5 4 3 2 1 G. Attends team meetings.

5 4 3 2 1 H. Provides quality participation in team meetings.

Self-Management -- Consider each area individually and rate your peer from 1 to 5.

5 4 3 2 1 A. Demonstrates and provides leadership

abilities.

5 4 3 2 1 B. Takes pride in and promotes the self-directed concept.

5 4 3 2 1 C. Strives to improve work relations and remedy team conflicts.

5 4 3 2 1 D. Maturely shares and accepts responsibility.

5 4 3 2 1 E. Is dependable, reliable, and trustworthy.

5 4 3 2 1 F. Can accomplish tasks with limited supervision.

5 4 3 2 1 G. Observes and follows plant policies.

Communications -- Consider each area individually and rate your peer from 1 to 5.

5 4 3 2 1 A. Accepts constructive criticism and/or feedback.

5 4 3 2 1 B. Gives constructive criticism and/or feedback.

5 4 3 2 1 C. Communicates respectfully to others.

5 4 3 2 1 D. Shares and seeks pertinent information.

5 4 3 2 1 E. Communicates through the proper channels.

5 4 3 2 1 F. Effectively communicates to team members.

5 4 3 2 1 G. Passes on all necessary information at shift changes.

Comprehension -- Consider each area individually and rate your peer from 1 to 5.

5 4 3 2 1 A. Demonstrates a proficient overall job knowledge.

5 4 3 2 1 B. Absorbs and retains learned experiences.

5 4 3 2 1 C. Ability to grasp and understand new procedures.

5 4 3 2 1 D. Resourceful employee that is capable of adapting to changing conditions.

5 4 3 2 1 E. Seeks assistance and asks questions when appropriate.

5 4 3 2 1 F. Clearly understands and applies instruction.

Openness -- Consider each area individually and rate your peer from 1 to 5.

5 4 3 2 1 A. Able to interact and cooperate with plant personnel.

5 4 3 2 1 B. Gives free expression of thoughts and ideas.

5 4 3 2 1 C. Relates to others truthfully and sincerely.

5 4 3 2 1 D. Handles interpersonal conflicts as an adult.

Quality -- Consider each area individually and rate your peer from 1 to 5.

5 4 3 2 1 A. Exemplifies a high level of overall quality consciousness.

5 4 3 2 1 B. Strives to eliminate any possible errors.

5 4 3 2 1 C. Has a genuine interest in producing a quality product while maintaining a high level of productivity.

5 4 3 2 1 D. Understands SPC and ensures that required studies are properly provided to the QA Department.

5 4 3 2 1 E. Keeps audit sheets filled out properly, including pressure testing, total ft, ball test, package numbers. Checks PO's to ensure product matches PO.

AVERAGES	RATINGS	
_____	_____	Safety and Hygiene
_____	_____	Attendance
_____	_____	Production
_____	_____	Attitude and Motivation
_____	_____	Teamwork
_____	_____	Self-Management
_____	_____	Communications
_____	_____	Comprehension
_____	_____	Openness
_____	_____	Quality

APPENDIX F

SUPPLEMENTAL TABLES

Table 9: Principal Components Factor Analysis with Varimax Rotation of the Twenty-one Activities Resulting in a Four-Factor Solution

Item	Factor 1	Factor 2	Factor 3	Factor 4
A1	0.75142	0.19393	0.09758	0.04242
A2	0.66820	0.06356	0.07468	0.40032
A3	0.81018	0.21109	0.26517	-0.18418
A4	0.69721	0.37265	-0.00807	0.09668
A5	0.21756	0.58382	0.24323	0.28314
A6	0.07541	0.18189	0.26634	0.55697
A7	0.32868	0.08222	0.39344	0.49993
A8	0.26738	0.20650	0.55701	0.22147
A9	0.33088	0.49613	0.21436	0.28300
A10	0.70192	0.17245	0.07914	-0.12956
A11	0.29423	0.73477	0.10998	0.25296
A12	0.32473	0.74351	0.04957	0.22378
A13	0.41809	0.64912	0.14520	0.38470
A14	-0.22103	0.28240	0.13113	0.74538
A15	0.27601	-0.03330	0.52724	0.33027
A16	0.53723	0.41628	0.36296	-0.22994
A17	-0.07248	0.21164	0.10286	0.67153
A18	0.00139	0.33819	0.72039	0.01244
A19	-0.03146	0.00606	0.67745	0.22513
A20	-0.03035	0.54118	0.59644	-0.04323
A21	0.17695	0.05984	0.63610	0.12031
MEANS:	5.38938	5.50442	4.82301	3.71681
s.d.:	3.94025	3.64281	2.98277	2.18137
EIGENVALUE:	7.23786	2.50529	1.56459	1.08125
VARIANCE BY FACTOR:	3.80729	3.14815	2.94426	2.48929

Factor 1 items: Discipline, Training, Performance Appraisal, Hiring, Select Team Leader, Job Rotation

Factor 2 items: Company Work Rules, Work Scheduling, Team Meetings, Team Goals, Team Decisions

Factor 3 items: Safety, Quality, Housekeeping, Maintenance, Compensation, Team Feedback

Factor 4 items: Physical Work Space, Management Feedback, Ordering Materials, Customer Contact

Table 10: Means and Standard Deviations of PERF, WOSAT, COWOSAT, and INCOMP Sorted by Gender, Age, Tenure, Education, and Team Membership

MODERATOR: Gender

	FEMALE N = 34		MALE N = 79	
	Mean	s.d.	Mean	s.d.
PERF*	32.27	2.45	32.64	2.22
WOSAT	6.47	4.09	8.38	3.27
COWOSAT	6.41	4.08	7.51	3.93
INCOMP	22.65	10.96	18.05	10.28

* Based on 11 females and 36 males

MODERATOR: Age (mean/s.d.)

	< 29 yr N = 23	30 - 39 N = 49	40 - 49 N = 29	50 - 59 N = 7	60 - 69 N = 5
PERF*	32.13/1.86	32.73/2.36	33.00/3.74	.....	32.50/0.71
WOSAT	9.30/2.70	7.43/3.58	7.86/3.68	5.71/4.19	7.20/5.45
COWOSAT	8.26/3.44	6.76/4.24	7.28/3.79	6.71/3.40	6.40/6.07
INCOMP	17.91/9.94	20.45/9.66	18.90/12.30	20.00/12.23	18.80/14.02

* Based on 15, 26, 4, 0, and 2, respectively

MODERATOR: Tenure (mean/s.d.)

	0 - < 4 Years N = 32	4 - < 8 Years N = 33	8 - < 12 Years N = 15	> 12 Years N = 33
PERF*	32.06/1.69	32.67/2.54	33.33/3.27	32.75/0.50
WOSAT	9.44/2.80	7.55/3.46	6.53/3.81	7.06/4.00
COWOSAT	9.62/2.84	6.33/3.93	5.67/4.03	6.33/4.11
INCOMP	20.81/11.79	19.61/11.04	20.27/10.81	17.55/9.13

* Based on 16, 21, 6, and 4, respectively

MODERATOR: Education (mean/s.d.)

	High School or less N = 45	High School plus N = 55	Associate Degree N = 6	Bachelor Degree N = 5	Graduate Degree N = 2
PERF*	33.05/2.27	32.05/2.31	33.67/2.08	30.00/....	32.00/0.00
WOSAT	8.44/3.56	6.87/3.78	10.00/1.10	9.40/2.51	8.50/0.71
COWOSAT	7.73/3.86	6.38/4.17	10.00/1.90	7.80/4.21	6.50/0.71
INCOMP	18.58/9.81	19.31/11.14	25.00/15.38	20.80/8.76	22.00/5.66

* Based on 21, 20, 3, 1, and 2, respectively

MODERATOR: Team Membership [mean and (std. dev.)]

TEAM Size	Z 17	A 22	B 20	C 20	Shipping 4	Maintenance 7	Office 22
PERF*	33.0	32.82 (2.6)	32.88 (1.8)	31.64 (2.2)	0.0	32.00	0.0
WOSAT	9.41 (2.5)	9.32 (4.4)	6.00 (3.4)	8.90 (3.5)	3.75 (3.77)	8.14 (3.8)	6.36 (4.1)
COWOSAT	10.06 (3.1)	6.95 (4.4)	6.95 (3.7)	6.45 (4.3)	2.50 (1.0)	7.29 (4.0)	6.86 (3.6)
INCOMP	16.76 (10.7)	22.82 (12.3)	20.85 (9.2)	17.95 (7.2)	24.75 (9.6)	10.71 (5.3)	19.95 (13.0)

* Based on 1, 17, 17, 11, 0, 1, and 0, respectively

Table 11: Team Participation Index

TO: **Team Members**

FROM: Jeff Pettit

SUBJ: Questionnaire

1. Please take some time to fill out this questionnaire about how teams operate. The information you provide will be used to investigate how team members feel about teams. It will also be used to support a research project for my doctoral degree at The University of Iowa. I have already discussed this study with the plant manager and he has given me his support. Additionally, Prof. Jude West at The University of Iowa is assisting me in this project.

2. I want to assure you about the privacy of your responses. **I am the only one who will see your responses and they will be coded such that I alone know the answers**. The plant team members and managers will see the final data outcomes, but no one will be able to distinguish one person from another.

3. If you have any questions, please feel free to ask me. Thank you for your help.

Jeff Pettit
Graduate Student

Name: _____

Please check (X) the appropriate blank.

Gender

Male ____ Female ____

Age

____ 29 or less
____ 30 to 39
____ 40 to 49
____ 50 to 59
____ 60 or more

Education

____ High School or less
____ High School plus additional courses
____ Associate Degree
____ Bachelor's Degree
____ Graduate Courses

Team Name

____ Z Production
____ A Production
____ B Production
____ C Production
____ Shipping
____ Maintenance
____ Office
____ Other

Years at Plant

____ 0 to less than 4 years
____ 4 to less than 8 years
____ 8 to less than 12 years
____ 12 years or more

Team Coordinator - Have you been or are you now a team coordinator?

Yes ____ No ____

This set of questions focuses on how much you actually participate in some of the activities performed by teams. PLEASE CIRCLE THE APPROPRIATE NUMBER. For example,

Within the team concept at the plant, I participate in planning the annual company picnic.

1	2	3	4	5
Not at All	Very Little	Some	Quite a Bit	A Very Great Deal

If you do not have much involvement with the planning of the picnic, you might respond with "Very Little" or circle the 2. For each of the following statements, indicate **your <u>actual</u> level of participation in each of the activities** by circling the number to the right of the statement.

****

WITHIN THE TEAM CONCEPT AT THE PLANT, I PARTICIPATE IN . . .

1. disciplining a team member when necessary.	1	2	3	4	5
2. training other team members.	1	2	3	4	5
3. evaluating a team member's performance.	1	2	3	4	5
4. hiring a new team member.	1	2	3	4	5
5. establishing company work rules or policies.	1	2	3	4	5
6. arranging the physical work space.	1	2	3	4	5
7. providing feedback to management.	1	2	3	4	5
8. identifying safety issues.	1	2	3	4	5
9. the work scheduling (vacation, overtime, time off).	1	2	3	4	5

1	2	3	4	5
Not at All	Very Little	Some	Quite a Bit	A Very Great Deal

WITHIN THE TEAM CONCEPT AT THE PLANT, I PARTICIPATE IN . . .

10.	selecting a new team leader.	1	2	3	4	5
11.	determining when team meetings will be held.	1	2	3	4	5
12.	setting team goals.	1	2	3	4	5
13.	making decisions that will affect the team.	1	2	3	4	5
14.	ordering materials.	1	2	3	4	5
15.	identifying quality control issues.	1	2	3	4	5
16.	the rotation of jobs within the team.	1	2	3	4	5
17.	discussing problems or suggestions with customers.	1	2	3	4	5
18.	the housekeeping practices.	1	2	3	4	5
19.	maintaining the machinery in the work area.	1	2	3	4	5
20.	compensation decisions.	1	2	3	4	5
21.	providing feedback to other teams.	1	2	3	4	5

The next set of questions seeks to find out how much you really want to be involved with the activities performed by a team. PLEASE CIRCLE THE APPROPRIATE NUMBER. For example,

Within the team concept at the plant, how active do I want to be in planning the annual company picnic?

1	2	3	4	5
Not at All	Very Little	Some	Quite a Bit	A Very Great Deal

If you want to be more involved than you are, you might respond with "Quite a Bit" or circle the 4. For each of the following questions, indicate **how active you <u>want</u> to be in each of the activities** by circling the number to the right of the question.

****

WITHIN THE TEAM CONCEPT AT THE PLANT, HOW ACTIVE DO I WANT TO BE WITH . . .

1. disciplining a team member when necessary?	1	2	3	4	5
2. training other team members?	1	2	3	4	5
3. evaluating a team member's performance?	1	2	3	4	5
4. hiring a new team member?	1	2	3	4	5
5. establishing company work rules or policies?	1	2	3	4	5
6. arranging the physical work space?	1	2	3	4	5
7. providing feedback to management?	1	2	3	4	5
8. identifying safety issues?	1	2	3	4	5
9. the work scheduling (vacation, overtime, time off)?	1	2	3	4	5

1	2	3	4	5
Not at All	Very Little	Some	Quite a Bit	A Very Great Deal

WITHIN THE TEAM CONCEPT AT THE PLANT, HOW ACTIVE DO I WANT TO BE WITH . . .

10. selecting a new team leader?	1	2	3	4	5
11. determining when team meetings will be held?	1	2	3	4	5
12. setting team goals?	1	2	3	4	5
13. making decisions that will affect the team?	1	2	3	4	5
14. ordering materials?	1	2	3	4	5
15. identifying quality control issues?	1	2	3	4	5
16. the rotation of jobs within the team?	1	2	3	4	5
17. discussing problems or suggestions with customers?	1	2	3	4	5
18. the housekeeping practices?	1	2	3	4	5
19. maintaining the machinery in the work area?	1	2	3	4	5
20. compensation decisions?	1	2	3	4	5
21. providing feedback to other teams?	1	2	3	4	5

***** This next set of statements is different. *****

Please indicate by CIRCLING Y(yes), N(no), or ?(not sure) how you feel about each of the statements. For example,

Work on my present job is very rewarding. Y(Yes) N(No) ?(Not sure)

If you feel that it is, circle the "Y."

Only circle one response. Do not mark between them or indicate both yes and no.

****

1. Work on my present job is fascinating. Y N ?

2. Work on my present job is challenging. Y N ?

3. Work on my present job gives me a sense of accomplishment. Y N ?

4. Work on my present job is frustrating. Y N ?

5. People on my present job are stimulating. Y N ?

6. People on my present job are responsible. Y N ?

7. People on my present job are loyal to the team. Y N ?

8. It is easy to make enemies with the people on my present job. Y N ?

YOU ARE FINISHED. THANK YOU FOR YOUR HELP.

Table 12: Actual and Desired Participation Score Averages from the Midwest Manufacturing Company

ACTIVITY	ACTUAL	DESIRED	DIFF.
1. Discipline	2.31	2.76	0.45
2. Training	3.27	3.55	0.28
3. Performance appraisal	3.30	3.27	(0.03)
4. Hiring	2.57	3.47	0.90
5. Company work rules	2.13	3.45	1.32
6. Physical work space	2.81	3.41	0.60
7. Feedback to Mgmt	3.09	3.65	0.56
8. Safety	3.04	3.46	0.42
9. Work scheduling	2.43	3.39	0.96
10. Team ldr selection	2.51	3.58	1.07
11. Team meetings	2.26	3.18	0.92
12. Setting team goals	2.73	3.57	0.84
13. Team decisions	2.76	3.63	0.87
14. Ordering materials	1.87	2.38	0.51

ACTIVITY	ACTUAL	DESIRED	DIFF.
15. Quality	2.67	3.30	0.63
16. Job rotation	2.62	3.42	0.80
17. Customer interaction	1.60	2.95	1.35
18. Housekeeping	3.33	3.40	0.07
19. Maintenance	2.48	2.82	0.34
20. Compensation	1.79	3.19	1.40
21. Feedback to teams	2.71	3.44	0.73

SATISFACTION WITH WORK Mean = 7.81

SATISFACTION WITH COWORKERS Mean = 7.18

INCOMPATIBILITY SCORE Mean = 19.43

Table 13: Correction for Attenuation

Reliabilities:	INCOMP = .94	ACTUAL = .90
	WOSAT = .65	DESIRE = .92
	COWOSAT = .77	

Correlation	Uncorrected	Corrected
ACTUAL & DESIRE	.58	.64
ACTUAL & INCOMP	-.46	-.50
DESIRE & INCOMP	.37	.40
ACTUAL & WOSAT	.29	.38
ACTUAL & COWOSAT	.29	.35
DESIRE & WOSAT	.17	.22
DESIRE & COWOSAT	.13	.15
INCOMP & WOSAT	-.21	-.27
INCOMP & COWOSAT	-.28	-.33
WOSAT & COWOSAT	.53	.75

Table 14: Correlation Matrix with INCOMP, ACTUAL, DESIRE, WOSAT, COWOSAT, and PERF

VARIABLE	N	MEAN	STD DEV	MIN/MAX
INCOMP	113	19.43	10.65	0/51
ACTUAL	113	54.27	13.48	22/92
DESIRE	113	69.24	13.75	25/97
WOSAT	113	7.81	3.62	0/12
COWOSAT	113	7.18	3.99	0/12
PERF	47	32.55	2.25	28/38

	INCOMP	ACTUAL	DESIRE	WOSAT	COWOSAT	PERF
INCOMP	1.00	-.46***	.37***	-.21*	-.28**	-.16
ACTUAL		1.00	.58***	.29**	.29**	.12
DESIRE			1.00	.17	.1[illegible]	.02
WOSAT				1.00	.53***	.03
COWOSAT					1.00	.15
PERF						1.00

*p < .05 **p < .01 ***p < .001

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