WORKING PAPER
ALFRED P. SLOAN SCHOOL OF MANAGEMENT

Bridging the Boundary: External Process and Performance in Organizational Teams

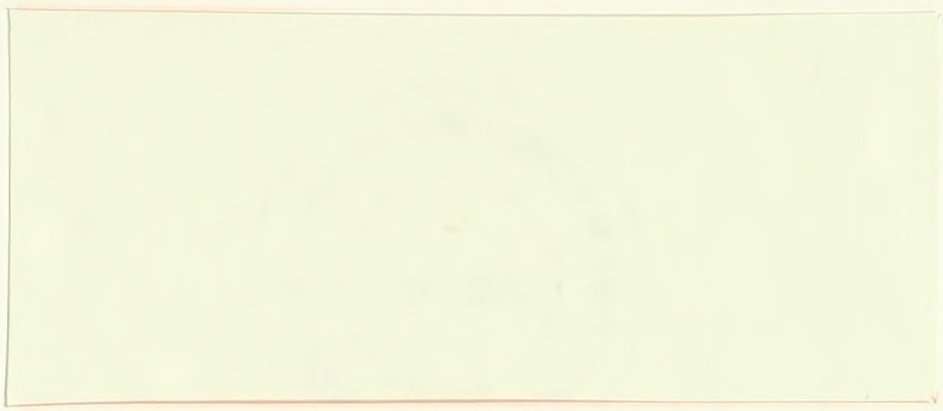
Deborah G. Ancona, 617/253-0568
MIT Sloan School of Management

and

David F. Caldwell, 408/554-4114
Leavey School of Business

Working Paper BPS-3305-91-BPS June, 1991

MASSACHUSETTS
INSTITUTE OF TECHNOLOGY
50 MEMORIAL DRIVE
CAMBRIDGE, MASSACHUSETTS 02139



Bridging the Boundary: External Process and Performance in Organizational Teams

Deborah G. Ancona, 617/253-0568
MIT Sloan School of Management

and

David F. Caldwell, 408/554-4114
Leavey School of Business

Working Paper BPS-3305-91-BPS June, 1991

Abstract

The nature of the external activities in which groups engage was investigated using a sample of 45 new product development teams. Three broad types of activities were identified. The levels of these activities rather than simply the frequency of team members' communication with outsiders was related to independent ratings of team performance. In addition, patterns of these activities were monitored in the teams and four strategies toward the environment were derived.

Overview

Although groups have always been an important tool for accomplishing organizational goals, the form and use of groups is changing rapidly. In response to the accelerating pace of technological and market change, organizations are frequently delegating more responsibility to temporary teams than they have in the past. Furthermore, organizational units often have to be more closely coupled than in the past, sometimes even working in parallel to complete assignments spanning traditional organizational units (Clark & Fujimoto, 1987; Henderson & Clark, 1990). Thus work group members must frequently interact extensively with non-team members to complete their assignments. As this trend continues, organizational groups can not be viewed as bounded units; rather they must be viewed as open systems interacting with other groups or individuals in the organizational environment. Despite the importance of such externally dependent teams, relatively little research has explored how they interact with other groups and how those interactions can facilitate the accomplishment of their assigned tasks.

Over the past half century social psychologists have devoted substantial attention to the fine-grained analysis of behavior within groups. Many frameworks exist for that analysis including models of group decision making (Bourgeois & Eisenhardt, 1988; Isenberg, 1986; Nemeth, 1986), task and maintenance activities (Bales, 1983; Benne & Sheats, 1948; Schein, 1988) , norm development (Bettenhausen & Murnighan, 1985), and evolution (Gersick, 1988, 1989) to name a few. The emphasis in previous research on what goes on within the group has been so strong that definitions of group process have described it solely in terms of the interactions among group members that transform resources into a product (Goodman, 1986; Hackman & Morris, 1975). Gladstein (1984) found, however, that group process entailed both internal group process and boundary managment. Both internal and external components are thought to be necessary to predict the performance to these new organization teams.

The purpose of this research is to examine the relatively unknown pattern of groups' external activities with essential others. Specifically, we describe the range of activities team

members use to interact with outsiders and form a typology; we test how external activities relate to team performance, and we examine how naturally occurring groups aggregate member activity into strategies for dealing with others.

Literature Review

Although the major emphasis in group theory has been on internal team dynamics there has been some attention paid to external interaction. This work has typically focused on the amount of information that the team acquires from its environment (c.f. Galbraith, 1977; Lawrence & Lorsch, 1967; Thompson, 1967). This information processing approach is normative; positing that groups must match their information processing capability to the information processing demands of the external environment (Tushman & Nadler, 1990). Support for this approach comes from studies showing that teams carrying out complex tasks in uncertain environments need high levels of external interaction to be high performing (Ancona & Caldwell, 1991; Gresov, 1988; Tushman, 1977, 1979). For example, in research and development teams, frequency of communication within the teams shows no relation to performance while increased communication between the teams and other parts of the laboratory was strongly related to project performance (Allen, 1984). High-performing teams also showed higher frequencies of comunication with organizational colleagues outside of R & D than their low-performing counterparts. However, by focusing primarily on the frequency of communication, these studies have not addressed the broader questions of the purpose and nature of those communications.

In direct contrast to the information processing theorists, researchers examining particular organizational phenomena have concentrated on specific activities enacted by groups. For example, those studying innovation have focused on boundary spanning and the transfer of technical information across team boundaries (Allen, 1984; Aldrich & Herker, 1977; Quinn & Mueller, 1963; Katz & Tushman, 1979), those studying interdependence have focused on coordination among groups (Malone, 1987), and those studying power and resource allocation

have focused on political or persuasive activities with external constituents (Dean, 1988; Pfeffer, 1981). Because they were studying specific organizational phenomena these researchers did not use the group as a focal unit. As such, they have not tried to map the full range of external activities used by groups to deal with a broad set of environmental demands.

A recent qualitative study of five consulting teams did examine team strategies toward the environment (Ancona, 1990). Three strategies were identified: informing, parading, and probing. Informing teams remain relatively isolated from their environment; parading teams have high levels of passive observation of the environment; and probing teams actively engage outsiders. Probing teams revise their knowledge of the environment through external contact, seek outside feedback on their ideas, and promote their teams' achievements within their organization. Probing teams were rated the highest performers one year after formation. Although this research specifically examines team-environment relations, it does so using a small sample and a non-profit organization. As such, the author was unable to statistically test how external activities cluster and relate to performance. The generalizability to other kinds of organizations is also unclear.

To look at external activities in isolation, however, is to forget that a complete theory of organization teams must look at both internal and external activities. Previous research has been equivocal about the extent to which a particular external mode of operation interfers with -- or facilitates -- the development of effective internal operations. Certain evidence suggests a negative relationship. The internal cohesion that exists under conditions of groupthink (Janis, 1982, 1985) promotes external stereotyping and avoidance of external information that interferes with current group consensus. The intergroup literature also suggests a negative realationship between internal and external activities. Groups often become underbounded-having many external ties but an inability to coalesce and motivate members to pull their external knowledge together--or overbounded--where there is great internal loyalty and a complex set of internal dynamics but an inability to reach out to the external world (Alderfer, 1976; Sherif, 1966). Finally, the conflict literature predicts intensified intragroup conflict when group members collect information from

outsiders with different goals, cognitive styles, and attitudes (Schmidt & Kochan, 1972; Shaw, 1971).

Yet not all studies indicate such a negative relationship. In a study of eight task forces Gersick (1988) found that groups undergo a mid-point change where they fundamentally shift their basic operating procedures. The study suggests that teams may deal with internal and external demands sequentially, first acting on initial information from the environment in isolation, then emerging to get further feedback and updated information from outsiders. A timing effect was also found in a study of five consulting teams where Ancona (1990) found that teams that were initially externally active but internally dissatisfied came to be cohesive as external interaction translated into higher performance.

This Study

This study attempts to fill some of the gaps left from previous research. It is an exploratory study that describes the nature of external activities, their link to performance, and the ways in which real organizational teams deal with both external and internal demands.

The Nature of External Activities. Before a complete theory of organization groups can be developed we need to know more about the nature of the external activities these groups undertake. Prior to hypothesis testing, or even hypothesis generating, comes the stage of description and classification (Gladstein & Quinn, 1985). We need to know what these teams do in order to ascertain the relevant variables for such a model.

The first goal of this research is to document and classify the range of external activities that one type of highly interdependent organizational group portrays. We want to know not only how much communication takes place between a group and its organizational context, but also the nature of that communication. We do not only want to know how a group transfers technical information, but also other types of communication that may be used to deal with a broad range of demands.

External Activities and Performance. While description and classification can be seen as ends in themselves, our second goal is to examine the relationship between external activities and performance. Teams are formed in organizations to meet the needs of individuals and to carry out some assigned task. Therefore, it seems important to understand whether external activities facilitate those outcomes. If they do, we can begin to speculate on the underlying causal factors linking external activities and performance. Then models of team performance can be generated that include both their internal and external components. In terms of application, we may then be better able to suggest how organization teams can improve their performance.

Unlike those researchers in the information processing school, we examine the relationship between different types of external activity and performance. Yet information processing research has already shown some link between the amount of external activity and performance. Thus, we also examine the link between frequency of communication and performance to ascertain whether our ability to predict performance is improved through the addition of this descriptive, content-based, approach.

Strategies. The third goal of this research is to examine how organization teams organize themselves to carry out external activity. In other words, which combinations or packages of activites occur naturally? For example, do some teams seem to specialize in one set of activities, while others are generalists? Do some teams not engage in external activities at all? While in the first part of this research we examine the range of external activities team members might undertake, not all groups have the capacity or willingness to exhibit the full range of activity. In this part of the research we look for patterns to see if teams tend to follow particular subsets of activity. Then, we examine how these patterns are related to other aspects of team functioning such as internal task work and cohesiveness.

Such an approach has analogues at the individual and organization levels. At the individual level, literally hundreds of traits have been identified. A person can be introverted or extroverted, have an internal or external locus of control, or be dominant or submissive. But much work has gone into identifying personalities, or combinations of traits that appear to identify

people. Thus, a paranoid personality is made up of different sets of traits than a compulsive personality, and each represents a very different approach toward the external world. At the organization level, strategy researchers have long been interested in classification schemes. Several typologies exist, including that of Miles and Snow (1978)--defenders, analyzers, prospectors--and Porter (1980)--cost leadership, differentiation, focus.

We follow the same logic at the group level as we seek to determine the external strategies that groups within organizations use. A typology of strategies will allow us to categorize groups in order to differentiate their forms and the implications of those forms. Just as we have learned a lot from categorizing individuals as paranoid or compulsive, and organizations as analyzers or defenders, so too may we be able to understand more about groups through this approach. We use the term strategy to label the patterns of external activity that are found. This is not to suggest that such patterns are necessarily intentional. Rather they represent the subset of activities a team has demonstrated for a given period of time. In contrast to the Ancona (1990) study, these strategies are derived statistically and are based on a larger sample.

Summary. While the study of small groups has been dominated by an internal focus the nature of teams in organizations today calls for a more external approach. In trying to build theory that combines the external and internal approaches it is first necessary to document and classify external activities so that the relevant variables can be discerned. After we identify a set of external activities we examine their impact on team effectiveness to answer two questions. First, do external initiatives make a difference to team outcomes? Second, does knowing the type of external activity improve prediction over the traditional information processing technique that examines frequency of external activity? Finally, we explore the ways in which on-going organizational teams approach their environment, and what effect that has on other aspects of team functioning. In short, we explore how teams, which do not have the necessary information and resources within their boundaries to complete their tasks, approach their environment and juggle these external demands with their internal ones.

METHODS

Description of Groups

This study involved product development teams in five corporations in the computer, analytic instrumentation, and photographic industries. All of the teams were responsible for developing a prototype new product (not basic research) and transfering it to their firm's manufacturing and marketing groups. All the projects used new or evolving technologies. For example, one product automated the sampling process in liquid chromatography; another combined photographic and computer imaging processes. All of the teams were temporary; they were formed to develop a specific prototype and disbanded once the task was complete. Each was formally headed by a project team leader. Team members normally have specific functional or technical skills; this assignment was typically the individual's primary responsibility at work.

Each organization provided access to a set of teams that had the following characteristics: (1) all the teams had to be developing a new product (defined as a major extension to an existing product line or the start of a new product line); (2) to ensure some broad consistency in the complexity of the products, all products had a development cycle of one and one-half to three years; (3) for comparability in performance evaluations, all the teams had to be located within a single division; and (4) teams ranged in performance; however, company executives did not reveal how teams were initially classified until all other data had been collected. Team membership was determined from company records and verified with team leaders; average size was approximately 10 (s.d. 6.2).

Data and Sample

This study used several sources of data. Interviews and logs were used to generate a list of external activities undertaken by the new product teams. Questionnaires were distributed to a

different, and larger, set of teams to determine the extent to which they believed it was their responsibility to carry out each type of activity, the frequency of external activity, the state of internal processes, and assessments of team performance. Interviews with the leaders of the teams that filled out the questionnaires were done to get a second assessment of team performance and to get background information on the teams.

To identify the set of actions group members might take in dealing with others, interviews were conducted with 38 experienced new-product-team managers (Ancona & Caldwell, 1987). During these semi-structured interviews, managers were asked to decsribe the interactions that they, or members of their team, had with other individuals outside the new product team. We asked these team leaders to be as inclusive as possible in their descriptions and to include all forms of communication including meetings, telephone calls, and computer messages. These interviews were taped and transcribed. In addition to the interviews, members of two new product teams were asked to keep logs of all their external activities over a two-week period. The interview transcripts and logs were reviewed by four individuals (the two authors and two graduate students) to identify an exhaustive list of actions team members and leaders took in dealing with individuals outside the team. These actions became the basis for questionnaire items measuring type of external activity.

Questionnaires were distributed to assess external activities, internal processes, and performance. The questionnaires were distributed to teams that did not take part in the previous interview and log data collection. A total of 450 questionnaires were distributed to team members and leaders of 47 teams. Since many of the items included in the questionnaire related to perceptions of the team, the questionnaires distributed to each team included a list of team members to ensure that individuals had a common referent. Completed questionnaires were returned by 409 individuals, yielding a response rate of approximately 89 percent. Response rates were approximately equal across the five companies; total responses per company varied from 39 to 129. Because much of the analysis was conducted at the group level, teams were included in the

final sample only if at least three-fourths of their members responded. This reduced the number of teams in the final sample to 45.

The average age of the individuals in the sample was 38.6 years; 88 percent were male; and 75 percent possessed at least a four-year college degree. Approximately 77 percent of the respondents were employed in the engineering or research and development functions of their companies; the remaining 23 percent were primarily from the manufacturing or marketing functions.

Measures

Types of Boundary Activity. The analysis of the interview and log data yielded a total of 24 items including actions such as persuading others to support the team, attempting to acquire resources for the team, and bringing technical information into the group.

The 24 boundary activities were converted to questionnaire items by asking respondents to indicate on five-point Likert scales the extent to which they felt each of the items was part of their responsibility in dealing with people outside the team. The complete set of these items is shown in Table 1.

Amount of Boundary Activity. Team members were asked how often they communicated with non-team individuals in the marketing, manufacturing, engineering and product management functions during the previous two week period. They responded on 6-point scales anchored by 1 = Not at all and 6 = Several times per day. Since these functional groups had different names in the companies, the questionnaires were modified to conform to company-specific terminology. Because these four groups represented every one with whom team members would normally communicate in their work, these responses were averaged. Team scores were computed by averaging the individual scores ($\overline{X}$ = 2.54, s.d. = .78).

There has been a debate in the literature as to whether organization members can accurately assess communication patterns. Bernard and colleagues (1980, 1985) claim that asking people

how much they talk to others produces inaccurate results. Individuals forget some communications and over count others. Other researchers have countered this criticism by showing that organization members may not reproduce exactly the communications that have just occurred, but their bias is in the direction of long-term patterns of communication (Freeman, Romney, & Freeman, 1987). So respondents are not actually answering the question "Who did I speak to in the last two weeks" but "In a typical two-week period, with whom am I likely to have spoken." Since our focus was this more general pattern of communication, the broad measure of communication frequency we used is appropriate.

Internal processes. As Goodman, Ravlin, and Schminke (1987) have noted, task-oriented group processes may be more directly related to performance than more traditional affect-based measures of group process. Members' perceptions of the teams' work–related group process were assessed with three items. Individuals used five point Likert scales to indicate the team's ability to develop workable plans, define goals, and prioritize work; high scores defined better perceived processes (see Hackman, 1983). Since a principal component analysis yielded a single underlying factor, these three items were averaged to form a single scale (alpha = .86). A score was then computed for each of the 45 teams by averaging the individual scores of the members of the team (X = 3.69, s.d. = .43).

Many of the arguments suggesting a negative link between external activities and internal process use cohesiveness as an indicator of process. This more traditional affect-based measure was assessed using Seashore's (1954) four items. These four items were averaged to form a single scale (alpha = .91). A score was then computed for each of the forty-five teams by averaging the individual scores of the members of the team (X = 3.7, s.d. = .81).

Team Performance. Following the stakeholder view of organiztions, team performance cannot be seen as a simple, uni-dimensional, construct. First, as Goodman, Ravlin, and Schminke (1987) argue, group measures of performance must be both fine-grained and related to the task. For example, if a group is responsible for completing an innovative new product, then performance measures should include the group's innovativeness not just general member

satisfaction. Second, Gladstein (1984) found that evaluations of group performance differ depending upon whether group members or managers are doing the rating. This supports Tsui's (1984) contention that different constituencies often have different definitions of performance and suggests that ratings from these various constituencies be included in a study of group performance. Finally, group researchers have found a lag effect between group process and performance (Ancona, 1990; Bettenhausen & Murnighan, 1985; Gladstein, 1984). This suggests that processes exhibited at time 1, may impact performance at time 1 or time 2. Going one step further, certain processes may have a positive effect in the short-term but turn out to be negative over time. Thus, this research examines the impact of external group processes on several measures of performance, as rated by both group members and top management, in the short-term and at project completion.

Performance data were collected at two points in time. The first coincided with other data collection from team members (time 1) and the second was approximately two years later, when teams had completed their projects or were in the final stages (time 2). Top division managers were asked to assess the teams in their company. Using five point Likert scales, they rated each team's efficiency, quality of technical innovations, adherence to schedules, adherence to budgets, and ability to resolve conflicts. Although the sample size was small, the performance items at each time were subjected to a principal components analysis to identify underlying patterns. Using the data collected at time 1, two factors emerged. One factor was defined by the adherence to budgets and adherence to schedules questions. We averaged those two items to form a single variable we call budgets and schedules. The remaining three items loaded on the second factor; we averaged them to create a variable we call efficiency of innovation . A different factor structure emerged when the performance measures collected at time 2 were analyzed. One factor, which we label innovation was defined solely by the single quality of technical innovations produced item. The second, which we label team operations was defined by the remaining four items, which were averaged to form a scale score. To assure comparability of the performance ratings across companies, individual scores for each team were adjusted by subtracting the mean of the scores

assigned to teams within that company. Thus the performance scores were adjusted for company and the overall means set to zero.

One additional performance measure was collected at time 1. Team members were asked in the questionnaire to rate the performance of their teams on six dimensions including efficiency, quality, technical innovation, adherence to schedules, adherence to budgets, and work excellence. These items were completed by all individuals, allowing a principal components analysis of the items was conducted. The analysis yielded a single factor. A score, which we call team rating was assigned to each team by averaging the individual members' scores (alpha = .83) (X = 3.63, s.d. = .38).

Analysis

The analysis moves through three stages: factor analysis, regression analysis, and Q-factor analysis. First, the 409 individual responses to the 24 boundary actions are factor analyzed to represent the underlying structure. Factor analysis allows us to describe external activities in a more succinct and non-overlapping manner than is permitted with the unwieldy 24 items. Factor scores are then calculated for each individual and averaged to form group scores.[1] Factor analysis yields several independent activity sets made up of highly related external actions. Next, regression analysis is used to determine the relationships between both frequency and type of activity and performance. This regression allows us to evaluate the usefulness of activity types, over and above the information processing model, in predicting performance.

Finally, Q-factor analysis is used to identify clusters of teams using the same pattern of external activities. Q-factor analysis is similar to cluster analysis in that it can produce a taxonomy of external strategies indicating how external activities work in combinations. While regression

---

[1]Note: modes of aggregation other than averaging were tested to examine different assumptions about how groups represent all individual member contributions. For example, we summed individual scores under the assumption that a team's external activity is simply the sum of individual contributions. Changes in aggregation procedures did not significantly affect results.

analysis statistically isolates the independent effects of each activity set, such a technique does not tell us which combinations or gestalts naturally occur and to what effect (Hambrick, 1983). Q-factor analysis groups together those teams that share common approaches to the environment, and these groupings can then be compared along other dimensions such as internal process.

RESULTS

Types of Boundary Activity

Individuals' ratings of the extent to which they assumed responsibility for each of the 24 boundary actions were analyzed with a principal component analysis and a varimax rotation. Four factors with eigenvalues greater than 1.0 explained 60 percent of total variance. Inspection of the Scree plot supported the four factor solution. Table 1 summarizes this analysis and shows the item loadings greater than .35.

INSERT TABLE 1 ABOUT HERE

Factors are described by items with loadings greater than .50. The first factor contains 12 items that reflect both buffering and representational activities. Examples of buffering included such things as protecting the team and absorbing outside pressure. Representational activities included persuading others to support the team and lobbying for resources. Since these activities represent both protective and persuasive goals, we label them as ambassador activities.

The second factor was defined by five items that represent interactions aimed at coordinating technical or design issues. Examples of activities in this set include discussing design problems with others, obtaining feedback on the product design, coordinating and negotiating with outsiders. We label these task coordinator activities.

The third factor was made up of four items describing behaviors that involve general scanning for ideas and information about the competition, the market, or the technology. We label this factor scout activity. These items differ from the previous items in that they relate to general scanning as opposed to handling specific coordination issues.

The fourth set of activities represent actions that avoid releasing information. We label the three items that define this factor guard activities. Since these activities differ from the other three in that they do not represent initiatives toward the environment, but rather internal activities to keep things from the environment, we do not include guard activities in subsequent analyses.

Factor scores were computed for each individual and then averaged to form scores for each group. Although orthogonal at the individual level, when the individual scores were averaged to form group scores some intercorrelation emerged. Table 2 shows means, standard deviations, and correlations among all variables. Ambassador activities are positively correlated with task coordinator activities and negatively with scout activities. Frequency of communication was not significantly related to any of the activity sets at the group level. There were some relationships between these externally-oriented activities and internal group process. Frequency of communication was significantly related only to cohesiveness, and the relationship is negative. Groups with high levels of ambassador activities reported higher ratings of internal process and marginally higher ratings of cohesiveness than groups with low levels of this activity. An opposite pattern was observed for scout activities. The level of that external activity showed small negative relationships with internal process and cohesiveness.

Boundary Activities and Product Team Performance

The correlational analysis indicates some significant relationships among performance measures, and between boundary activities and performance. Not surprisingly some performance measures are also interrelated. Recall that the management ratings of performance are adjusted by a subtraction of the company mean to insure comparability across companies. The two time 1

management ratings of performance were positively related and were both related to the time 2 measure of innovation. The teams' own ratings of performance were unrelated to management's ratings of performance.

Of central interest are the correlations between the boundary activities and performance. Ambassador boundary activities were positively associated with managements' ratings of teams' ability to meet budgets and schedules (time 1) and of team members' ratings of their own performance (time 1). There is also some relationship with management ratings of innovation (time 2). Higher levels of task coordinator activities were associated with higher ratings (two significant at $p < .05$; two marginal at $p < .10$) on all four management provided performance measures (time 1 and time 2). An opposite pattern was true for scout activities, which were negatively associated with ratings on the time 1 measures of budgets and schedules and innovation efficiency and the time 2 measure of innovation as well as team ratings of performance. Frequency of communication was marginally associated with time 1 meeting budgets and schedules and efficiency of innovation, and highly negatively related to team ratings of performance.

INSERT TABLE 2 ABOUT HERE

Table 3 reports regression equations for each of the five performance measures. The results are straightforward. Adherence to budgets and schedules (time 1) was positively related to frequency of communications and ambassador activities and negatively related to scout activities. Efficiency of innovation (time 1) was negatively related to scout activities. Task coordinator activity is no longer related to time 1 managment-rated performance, perhaps due to multi-collinearity. The teams' ratings of their own performance (time 1) was negatively related to frequency of communication with others. The final ratings, obtained after the projects were completed were somewhat different. Innovation (time 2) was positively related to task coordinator activities and negatively related to scout activities. Team operations (time 2) which included adherence to both budgets and schedules was not predicted by the external activities.

INSERT TABLE 3 ABOUT HERE

Group Strategies for Boundary Management

The relationships among the group-level measures of boundary activities suggest that teams may use consistent strategies to deal with outsiders. In other words, teams may make clear choices (whether intentionally or not) to undertake certain boundary activities and not others. To identify these strategies, Q-factor analysis was used. In contrast to more conventional R-factor analysis, Q-factor analysis is based on the respondents, rather than the variables, and seeks to combine or condense respondents into distinctly different groups within the population. Q-factor analysis differs from cluster analysis in that the groupings are based on intercorrelations between means and standard deviations of the respondents rather than on the absolute distances between the respondents' scores. Thus, Q-factor analysis may be more sensitive to patterns among the variables than absolute differences in magnitude.

A Q-factor analysis with a varimax rotation was performed on the 45 groups using the group scores on the ambassador, task coordinator, and scout variables. This analysis identified four distinct sets of groups that are depicted in Table 4. The first part of Table 4 shows the results of three one-way analyses of variance (with group size as a covariate) using group scores on the ambassador, task coordinator, and scout variables as dependent variables.

The Q-factor analysis identified four strategies. The first concentrates on ambassador activities and very little else. In other words, team members' outside activities are primarily as ambassadors. As such we label this strategy ambassadorial. The second strategy combines scout activities with some task coordination. Since this set of teams is scanning the environment for technical data rather than persuading top management of its achievements it is labeled technical scouting. The third set of teams is relatively low on all dimensions, although there is some minimal scout activity. We label this strategy isolationism. Finally, the fourth set of groups have

members feeling responsible for both ambassador and task coordination activities, but little scouting. This strategy avoids general scanning; it focuses on external interaction to both persuade others that its work is important, and to coordinate, negotiate, and obtain feedback from outside groups. We label this strategy comprehensive.

Table 4 provides data illustrating properties of teams following different strategies. There were significant differences in communication patterns across strategies. Those teams following the ambassadorial strategy and the isolationism strategy have the lowest frequency of communication with outsiders and although not shown, members of these teams spend the lowest percentage of their time with outsiders (12% and 10% respectively). In contrast, technical scouting and comprehensive teams have the highest frequency of external interaction and spend the highest percentage of their time with outsiders (18% and 16% respectively). More in-depth analysis shows that ambassador activity (found in teams using ambassadorial and comprehensive strategies) may show low levels of external communication because individuals have high levels of communication with top division and top corporate management. This concentrated communication requires a lower frequency of interaction than the more diffuse communication patterns found with strategies involving scout and task coordinator activity. The latter involve high levels of interaction across manufacturing, marketing, and R & D.

The external strategies have implications for internal processes as well. Ambassadorial teams show the most effective task processes and highest cohesiveness. This form of external interaction either promotes useful internal interaction, or effective internal interaction allows for this legitimating external activity. Thus, while in general high levels of external activity are related to poor internal processes, certain types of external activity facilitate, or are facilitated by, effective internal processes.

The various strategies show different relationships to performance. While both ambassadorial and comprehensive strategies are related to achieving budgets and schedules in the short term (time 1), only the comprehensive strategy is positively related to performance over time (innovation, time 2). Both the technical scouting teams and the isolationism teams have poor

performance across performance indicators over time (see Table 4).

INSERT TABLE 4 ABOUT HERE

DISCUSSION

The increasing reliance on teams to develop products and processes requires that teams span traditional organizational boundaries. Furthermore, as levels of middle management disappear teams are given increasing responsibility to define, market, carry out, and transfer their work. These new responsibilities require extensive external interaction with organizational members outside the groups' boundaries. This study has explored the nature of those external activities and their relationships to other key group variables. Results show new models of group process, new understandings of the factors related to group performance, and a typology of group strategies toward the environment.

Group Process Revised

This study identifies four activity sets labeled ambassador, task coordinator, scout, and guard activities. Ambassador activities reflect primarily buffering, e.g. absorbing pressures and protecting the team, and representational activities, e.g. persuading others to support the team and lobbying for resources. Task coordinator activities are aimed at coordination around specific technical issues such as obtaining feedback on the product design on negotiating delivery deadlines with outsiders. Scout activities entail more general scanning for ideas and information than the specific, focused task coordination. Finally, as the existence of guard activities indicates, these external activities are combined with internal activities to determine the permeability of a group's boundary.

External initiatives appear to allow the group to access key resources in the environment. Ambassadorial activities provide access to the power structure of the organization; they are aimed at managing vertical dependence. These activities protect the team from excessive interference from the top, and facilitate the group's legitimacy and survival by identifying key threats, securing resources, and promoting the image of the team. Task coordinator activities provide access to the work flow structure; they are aimed at managing horizontal dependence. These activities probably fill in many of the gaps left by formal integrating systems. Through coordination, negotiation, and feedback, these activities allow for tighter coupling with other organizational units who also contribute to the group's final output. Scout activities provide access to the information structure; they are aimed at adding to the expertise of the group. These activities allow the group to update its information base, providing new ideas and signaling changes in technologies and markets.

This research suggests that external activities can be effectively combined with internal processes. While frequency of communication alone and scout activities are negatively related to cohesiveness and internal processes, ambassador activities are positively related to internal measures. Thus, teams appear to be able to coalesce if they have specific, focused external activity aimed at influencing powerful outsiders. Continuous high levels of activity aimed at obtaining more general information about the environment interferes with the team's ability to set goals and develop support among members. Since this ambassadorial activity appears to improve performance, while scout activity dampens performance, it appears that the external activities that are associated with good internal processes also are associated with performance.

Although all kinds of organization groups (e.g. task forces, sales teams, innovating teams, and even top management teams) face external dependence these activities have not been incorporated into our models of group process. This research suggests that external boundary activities be added to task and maintenance activities in order to more fully represent the full range of what group members do. Clearly, in organizational settings many groups do not work in the isolation characteristic of artificial groups that previously have been studied. Real groups need to

manage their boundaries and adapt to the organizational environment. An enlarged model would also help managers to structure team activities to meet internal and external objectives.

Predicting Performance

As the results indicate, the pattern of external activities are more important than simply the frequency of communication. Frequent communication is marginally related to management ratings of performance at time 1 but not at time 2. The activity sets are more strongly related to management ratings of performance, than frequency. In addition, the activity sets related to the different performance measures in singular ways. Ambassador activities were related to time 1 management ratings of the teams' adherence to budgets and schedules. Task coordination activities, however, were positively related to management ratings of innovation at time 2. In contrast to this pattern, very general intelligence gathering -- defined by a high level of scout activity -- was associated low managerial ratings of performance at both time 1 and time 2.

Analyzing team strategies provides a little more insight into long-term performance. While ambassadorial activities seem to be a key to performance, their effect over the long-term seems to hold only in combination with task coordinator activities. Pure ambassadorial teams and comprehensive teams move along on budget and schedule at time 1. At time 2, however, the ambassadorial teams are poor at innovation and team operations, while the comprehensive teams continue to be the highest performers. This suggests that while managing the power structure alone may work in the short-term teams that manage both the power structure and the work-flow structure maintain perfomance over time. This finding is similar to that reported by Zurger and Maidique (1990). Furthermore, not all task related activity is effective. Too much scout activity is related to low performance ratings. It may be that such teams constantly react to general environmental data and become unable to commit to producing a specific end product at a specific point in time. Or, it may be that high levels of scout activity somehow reduces the efforts team

members put into the more performance-relevant external activities or into building effective internal processes.

A very different pattern emerges when the team rates its own performance. Teams feel that they perform well when they concentrate their efforts internally; they reveal perceptions of performance that are negatively related to frequency of communication and positively related to clear goals and priorities and high cohesiveness. Thus, predictors of management rated and team-rated performance are very different.

Team members may well have followed an attribution process similar to that described by Staw (1975), Calder (1977) and Gladstein (1984). For example, Calder argued that individuals have implicit theories of what makes a leader. When they see all or even a few of these behaviors they attribute leadership status to that person. Similarly, Gladstein found that group members label their group as high performing when they exhibit process characteristics (e.g. high levels of intra-group coordination and strong internal process) thought to be linked to performance. This activation of implicit theories then guides the interpretation of subsequent behaviors.

Group Strategies

This study identified four strategies that groups use toward their environment. In one set of groups members concentrated solely on ambassador activities, so we label their strategy ambassadrial. The second set of groups had members concentrate on scout activities so we label their strategy general scouting. The third set of groups had relatively low scores on all activity sets so their strategy is labeled isolationism. Finally, the last set of groups included members engaged in both ambassador and task coordinator activities. This set of teams approached a broad set of external constituents with a broad range of activities and their strategy is thus labeled comprehensive.

The group strategies observed in this study are very similar to those found by Ancona (1990) despite having been derived from a very different set of teams, in companies from different

industries, and using a very different methodology. Ancona found one set of teams that remained relatively isolated from key external constituents, and another that engaged in extensive scanning or "parading" within the environment with no specific agenda. A third set of groups had high levels of interaction both vertically and horizontally with the environment, and engaged in both self-promotion and idea testing with outsiders. However, in Ancona's study there were no groups exclusively following the political persuasion strategy.

These two studies together provide support for the validity of these strategies as representing real patterns found in organizational teams today. In addition, this taxonomy provides a basis for categorizing groups and differentiating their forms and the implications of those forms.

These strategies also illustrate the contribution of a content, rather than a frequency-based, approach to external interaction. If we were to look at external frequency alone, teams following an isolationism and ambassadorial strategy would be grouped together as low frequency communicators and teams following a general scouting and comprehensive strategy would be grouped together as high frequency communicators. Yet such a classification would mask great within group variance. Furthermore, given the uncertainty and complexity of the high-technology, new product team environment, one would predict that high frequency teams would be better performers. As shown, this is not always the case.

Finally, while some strategies appear to be more related to performance than others these strategies are not automatically followed. The coalition formation strategy was better linked to all performance ratings than other strategies but only 10 out of 45 teams followed this strategy. Others followed only parts of the strategy, e.g. ambassadorial teams, or strategies not at all linked to performance e.g. general scouting teams. Future research is needed to ascertain whether groups do not follow optimal strategies because they do not know what these strategies are, or they know them but do not have the resources to implement them, or if organizational or task variables prompt less optimal external actions.

Limitations

This study has some inherent weaknesses that limit the generalizability of the findings and the validity of the results. The study was done in high-technology industries using teams with high levels of external dependence and coordination demands. While this allowed us to map a wide domain of external activities, the findings may not apply to more isolated, self-contained teams. Indeed, we argue that the internal perspective with its emphasis on internal dynamics may well predict performance in T-groups, laboratory groups, and autonomous work groups–it just does not do well for the new, more externally-tied organization groups. Obviously, the inverse may hold too, limiting the external perspective to organizational groups such as new product teams, sales teams, or cross-functional task forces.

In addition, the study utilized subjective ratings of performance, albeit from multiple sources. While more objective ratings such as percent over budget or actual sales have been suggested, (Clark & Fujimoto, 1987) it was our experience that these numbers were often interpreted through subjective lenses, were influenced by numerous other external factors not under the control of the team. (e.g. an economic recession) and were less important than managerial ratings in determining promotions, future job assignments, and performance evaluations. Nonetheless, subjective ratings are just perceptions and we may be mapping performance onto distorted perceptions. Finally, the use of self-report measures raises the question of how much of the explained variance is common-method variance and how much is true variance. This is particularly problematic in investigating the link between team-rated process and performance.

Despite these limitations the study does represent one of the few large-scale empirical studies of groups within organizations. It demonstrates that while the dominant internal perspective has stressed internal group processes, the external perspective illuminates the wide range of external activities that many organizational groups exhibit. Ambassador, task coordinator, and scout activities represent an added dimension of group process. These dimensions are

configured in particular patterns within the groups studied here. Some groups concentrate on ambassadorial activities (ambassadorial strategy), others on scouting (technical scouting strategy), others not on anything (isolationist strategy) and others on both ambassador and task coordinator activities (comprehensive strategy). While the study illustrates a stronger relationship between external activities and managerially-rated performance than for internal processes and performance, not all external strategies are equally successful and higher frequency of external activity alone is not enough to sustain performance. Key activities are ambassador and task coordinator. Yet the former, alone, only works in the short-term. Persuasion and political influence without backup of technical innovation and a solid product, is found out over time.

Therefore, this study has greatly expanded our knowledge of the external perspective. It has expanded our sample of groups to include intact teams in organizations and used those teams to shift our models of process and performance. There is support for moving the group-research lens from a position looking solely within the group, to one that rotates from an inward to an outward perspective. Perhaps only then can we learn to reconcile the alternative models of team members and managers in terms of the precursors of group performance, and learn to understand the new kind of group that is so prevalent in the corporate arena.

REFERENCES

Alderfer, C.P. 1976. Boundary relations and organizational diagnosis. In M. Meltzer and F. Wickert (Eds.), ***Humanizing organizational behavior***, 142-175. Springfield, IL: Charles C. Thomas.

Aldrich, H.E., & Herker, D. 1977. Boundary spanning roles and organization structure. ***Academy of Management Review***, 2: 217-230.

Allen, T.J. 1984. ***Managing the flow of technology: Technology transfer and the dissemination of technological information within the R & D organization.*** Cambridge, MA: The M.I.T. Press.

Ancona, D.G. 1990. Outward bound: Strategies for team survival in the organization. ***Academy of Management Journal***, 33(2): 334-365.

Ancona, D.G. & Caldwell, D.F. 1987. Management issues facing new-product teams in high technology companies. In D. Lewin, D. Lipsky, and D. Sokel (Eds.), ***Advances in Industrial and Labor Relations***, 4: 199-221, Greenwich, Ct: JAI Press.

Ancona, D.G. & Caldwell, D.F. 1991 Demography and design: Predictors of new product team performance, ***Organization Science***, forthcoming.

Bales, R.F. 1983. SYMLOG: A practical approach to the study of groups. In H. H. Blumberg, A. P. Hare, V. Kent & M.F. Davies (Eds.), ***Small groups and social interaction***, 2: 499-523.

Benne, K., & Sheats, P. 1948. Functional roles of group members. ***Journal of Social Issues,*** 2: 42-47.

Bernard, H.R., Killworth, P.D., Kronenfeld, D. & Sailer, L. 1985. On the validity of retrospective data: The problem of informant accuracy. ***Annual Review in Anthropology***. Palo Alto: Stanford University Press.

Bernard, H.R., Killworth, P.D. & Sailer, L. 1980. Informant accuracy in social network data, IV: A comparison of clique-level structure in behavioral and cognitive data. ***Social Networks***, 2: 191-218.

Bettenhausen, K. & Murnighan, J.K. 1985. The emergence of norms in competitive decision-making groups. ***Administrative Science Quarterly***, 30: 350-372.

Bourgeois, L.J. & Eisenhardt., K.M. 1988. Strategic decision processes in high velocity environments: Four cases in the microcomputer industry. ***Management Science***, (34)1: 816-835.

Calder, R.J. 1977. An attribution theory of leadership. In B.M. Staw and G. R. Salancik (Eds.), ***New directions in organizational behavior***, 179-204. Chicago: St. Clair.

Clark, K.B. & Fujimoto, T. 1987. ***Overlapping problem solving in product development.*** Working Paper 87-048, Harvard University Graduate School of Business Administration, Cambridge, MA.

Dean, J.W., Jr. 1987. ***Deciding to innovate: Decision processes in the adoption of advanced technology***. Cambridge, Masss.: Ballinger Publishing Company.

Freeman, L., Romney, A.K. & Freeman, S.E. 1987. Cognitive structure and informant accuracy. ***American Anthropologist***, 89: 310-325.

Galbraith, J.R. 1977. ***Organization Design.*** Reading, MA: Addison-Wesley.

Gersick, C.J.C. 1988. Time and transition in work teams: Toward a new model of group development. ***Academy of Management Journal,*** 31(1): 9-41.

Gersick, C.J.C. 1989. Marking time: Predictable transitions in task groups.. ***Academy of Management Journal,*** 32(2), 274-309.

Gladstein, D. 1984. Groups in context: A model of task group effectiveness. ***Administrative Science Quarterly,*** 29: 499-517.

Gladstein, D. & Quinn, J.B. 1985. Making decisions and producing action: The two faces of strategy. In H. Pennings (Ed.), ***Organizational strategy and change:*** 198-216. San Francisco: Jossey-Bass.

Goodman, P. 1986. The impact of task and technology on group performance. In P. Goodman (Ed.), ***Designing effective work groups***: 198-216. San Francisco: Jossey-Bass.

Goodman, P.S., Ravlin, E., & Schminke, M. 1987. Understanding groups in organizations. In L.L. Cummings & B.M. Staw (Eds.), ***Research In Organizational Behavior***, 9: 1-71.

Gresov, C. 1989 Exploring fit and misfit with multiple contingencies. ***Administrative Science Quarterly***, 34: 431-453.

Hackman, J. R., & Morris, C. G. 1975. Group tasks, group interaction process and group performance effectiveness. A review and proposed integration. In L. Berkowitz (Ed.), ***Advances in experimental social psychology***, 8: 45-99. New York: Academic Press.

Henderson, R.M., and Clark, K.B. 1990. Architectural innovation: The reconfiguration of existing product technologies and the failure of established firms. ***Administrative Science Quarterly***, 35: 9-30.

Hambrick, D.C. 1983. Some tests of the effectiveness and functional attributes of Miles and Snow's strategic types. ***Academy of Management Journal***, 26(1): 5-26.

Isenberg, D.J. 1986. Group polarization: A critical review and meta-analysis. ***Journal of Personality and Social Psychology***, 50: 1141-1151.

Janis, I.L. 1982. ***Groupthink***. Boston, MA: Houghton Mifflin.

Janis, I.L. 1985. Sources of error in strategic decision making. In Johannes M. Pennings and Associates (Eds.), 157-197. ***Organizational strategy and change***, Jossey-Bass, San Francisco, CA.

Katz, R. & Tushman, M. 1979. Communication patterns, project performance, and task characteristics: An empirical evaluation and integration in an R&D setting. ***Organizational Behavior and Human Performance***, 23: 139-162.

Lawrence, P.R., & Lorsch, J.W. 1967. ***Organization and environment: Managing differentiation and integration.*** Homewood, IL: Richard Irwin.

Malone, T.W. 1987. Modeling coordination in organizations and markets. ***Management Science***, 23: 1317-1332.

Miles, R.E. & Snow, C.C. 1978. ***Organizational strategy, structure and processes.*** New York: McGraw-Hill.

Nemeth, C.J. 1986. Differential contributions of majority and minority influence. ***Psychological Review***, 93: 23-32.

Nadler, D.A. & Tushman, M.L. 1988. ***Strategic organization design: Concepts, tools, and processes.*** Glenview, Illinois: Scott, Foresman and Company.

Pfeffer, J. 1981. ***Power in organizations.*** Marshfield, Mass.: Pitman.

Porter, M.E. 1980. ***Competitive strategy.*** New York: Free Press.

Quinn, J.B. and Mueller, J.A. 1963. Transferring research results to operations. ***Harvard Business Review,*** 41 (January-February): 44-87.

Schein, E.H. 1988. ***Process consultation: its role in organization development,*** (Vol. 1). Reading, Mass.: Addison-Wesley.

Schmidt, S.M., and Kochan, T. 1972. The concept of conflict: Toward conceptual clarity, ***Administrative Science Quarterly,*** 17: 359-370.

Seashore, S. 1954. ***Group cohesiveness in the industrial work group.*** Institute for Social Research, University of Michigan.

Shaw, M. 1971. ***Group dynamics: The psychology of small group behavior.*** New York: McGraw-Hill.

Sherif, M. 1966. ***In common predicament: social psychology of intergroup conflict and cooperation,*** Boston, MA: Addison-Wesley.

Staw, B.M. 1975. Attribution of the 'causes' of performance: A general alternative interpretation of cross-sectional research on organizations. ***Organizational Behavior and Human Performance***, 13: 414-432.

Thompson, J.D. 1967. ***Organizations in action.: Social science bases of administration therapy*** New York: McGraw-Hill Book Company.

Tsui, A.S. 1984. A role set analysis of managerial reputation. ***Organizational Behavior and Human Performance***, 34: 64-96.

Tushman, M.L. 1977. Special boundary roles in the innovation process. ***Administrative Science Quarterly,*** 22: 587-605.

Tushman, M.L. 1979. Work characteristics and subunit communication structure: A contingency analysis. ***Administrative Science Quarterly***, 24: 82-98.

Zurger, B.J. and Maidique, M.A. 1990. A model of new product development: An empirical test. ***Management Science***, 36: 876-888.

TABLE 1

VARIMAX FACTORY LOADINGS FOR BOUNDARY MANAGEMENT DIMENSIONS
n=409

	1	2	3	4
Absorb outside pressures for the team so it can work free of interference.	.785			
Protect the team from outside interference.	.740			
Prevent outsiders from "overloading" the team with too much information or too many requests.	.719			
Persuade other individuals that the team's activities are important.	.654			
Scan the environment inside your organization for threats to the product team.	.636		.417	
"Talk up" the team to outsiders.	.602			
Persuade others to support the team's decisions	.592	.416		
Acquire resources (e.g. money, new members, equipment) for the team.	.587	.417		
Report the progress of the team to a higher organizational level.	.553	.403		
Find out whether others in the company support or oppose your team's activities.	.551		.449	
Find out information on your company's strategy or political situation that may affect the project.	.549		.430	
Keep other groups in the company informed of your team's activities.	.519	.421		
Resolve design problems with external groups.		.776		
Coordinate activities with external groups.		.660		
Procure things which the team needs from other groups or individuals in the company.		.657		

	1	2	3	4
Negotiate with others for delivery deadlines.		.618		
Review product design with outsiders.	.	.515	.404	
Find out what competing firms or groups are doing on similar projects.			.791	
Scan the environment, inside or outside the organization for marketing ideas/expertise.			.719	
Collect technical information/ideas from individuals outside of the team.		.424	.645	
Scan the environment inside or outside the organization for technical ideas/expertise.		.491	.587	
Keep news about the team secret from others in the company until the appropriate time.				.823
Avoid releasing information to others in the company to protect the team's image or product it is working on.				.817
Control the release of information from the team in an effort to present the profile we want to show.				.592

TABLE 2 -- CORRELATIONS AMONG ALL VARIABLES

GROUP VARIABLES	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12
1. Frequency of communication	2.61	.86	–											
2. Ambassador activities	.14	.47	-.13	–										
3. Task coordinator activities	.02	.43	.14	.26*	–									
4. Scout activities	.02	.38	.00	-.38**	.02	–								
5. Guard activities	-.15	.38	-.05	-.01	.07	.18	–							
6. Internal Process	3.69	.44	-.16	.47**	-.01	-.22+	-.12	–						
7. Cohesiveness	3.30	.46	-.54**	.24+	-.10	-.23+	.25+	.39**						
PERFORMANCE MEASURES														
8. Budgets & Schedules (Time 1)	.01	.95	.24+	.45**	.30*	-.43**	-.08	.12	.02	–				
9. Efficiency of Innovation (Time 1)	.03	.79	.21+	.14	.22+	-.36**	.04	.17	-.04	.42**	–			
10. Team Rating (Time 1)	3.63	.38	-.48**	.31*	.07	-.19+	.18	.58**	.89**	.03	.15	–		
11. Innovation (Time 2)	.00	.64	.13	.23+	.43**	-.41**	-.11	.09	-.03	.53**	.46**	.03	–	
12. Team Operations (Time 2)	.00	.63	.14	.02	.21+	.02	-.08	.08	.09	.17	.27	.00	.20	–

+ $\rho < .10$
* $\rho < .05$
** $\rho < .01$

TABLE 3 -REGRESSION RESULTS[a]

	Budgets & Schedules (Time 1)	Efficiency of Innovation (Time 1)	Team Rating (Time 1)	Innovation (Time 2)	Team Operations (Time 2)
Frequency of Communication	.25+	.17	-.46**	.06	.11
Ambassador Activities	.31 *	-.04	.18	-.05	-.01
Task Coordinator Activities	.19	.21	.09	.45**	.20
Scout Activities	-.32*	-.38*	-.12	-.44**	.01
Adjusted r^2	.31	.12	.24	.29	.00
F	5.24**	2.26+	4.61 **	4.87**	0.51

+ $\rho < .10$

* $\rho < .05$

** $\rho < .01$

a Entries are standardized regression coefficients

TABLE 4 - MEANS OF DEPENDENT MEASURES ACROSS FOUR STRATEGIES

STRATEGIES	Ambassadorial	Technical Scouting	Isolationism	Comprehensive	SIG[a]
IDENTIFYING CHARACTERISTICS					
Ambassador	.52	-.21	-.07	.33	**
Task Coordinator	-.17	.24	-.32	.36	**
Scout	-.20	.38	.18	-.28	**
FREQUENCY OF COMMUNICATION	2.17	2.69	2.47	3.24	*
INTERNAL PROCESSES					
Task Process	3.89	3.49	3.70	3.78	+
Cohesiveness	3.14	2.59	2.80	2.64	*
PERFORMANCE					
Budgets & Schedule (Time 1)	.25	-.38	-.37	.83	**
Efficiency of Innovation (Time 1)	-.03	-.17	-.01	.39	N.S.
Team Rating (Time 1)	3.61	3.40	3.45	3.55	N.S.
Innovation (Time 2)	-.08	.01	-.42	.37	+
Team Operations (Time 2)	-.22	-.04	.13	.24	N.S.

[a] - significance refers to main effects from one way analyses of variance using size as a covariate

* $\rho < .05$

** $\rho < .01$

\+ $\rho < .10$