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Toward Understanding Team Leadership: The Empirical Development of a Team Leadership Classification System

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TOWARD UNDERSTANDING TEAM LEADERSHIP: THE EMPIRICAL DEVELOPMENT OF A TEAM LEADERSHIP CLASSIFICATION SYSTEM

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ABSTRACT

TOWARD UNDERSTANDING TEAM LEADERSHIP: THE EMPIRICAL DEVELOPMENT OF A TEAM LEADERSHIP CLASSIFICATION SYSTEM.

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The purpose of this research was to develop a classification system of team leadership through the empirical process of numerical classification. Although the value and importance of leadership have been recognized in the team literature, few empirical studies have been conducted to understand the phenomenon of team leadership. A thorough review of the relevant literature was conducted to identify the various behaviors, functions, traits, and KSAOs associated with team leadership. This information was then used to select and construct data collection instruments for the classification process.

Two separate studies were conducted to achieve the overall goal of developing a team leadership classification system. In the first study, the data collection instruments were constructed and tested with a sample of 71 teams, each team being represented by a single subject matter expert. The instruments included a structured interview, a leadership questionnaire, a leadership behaviors form requiring extent of involvement and importance ratings, a leader behavior rating task based on the LBDQ-XII and LOQ, a KSAO rating task, a leader involvement rating task, and a

measure designed to assess an entity's level of "teamness." A series of statistical analyses (e.g., exploratory and confirmatory factor analyses, reliability and item analyses) were performed to evaluate and refine the psychometric properties of the measures.

In the second study, the revised and refined measures were used to collect data on a diverse sample of 100 teams. Data from four of the measures were used to identify team leadership types by means of Ward's method of hierarchical agglomerative cluster analysis. Various cluster solutions were evaluated through the two-sample cross-validation procedure, and the best solutions were identified on the basis of their stability and estimated accuracy. The external validity of the three most accurate solutions was then evaluated through a series of analysis of variance procedures with dependent data provided by the interview, questionnaire, and teamness measure. Based on the results, a classification system of five team leadership types was selected, described, and validated. Implications of the research are discussed and recommendations for future research are provided.

To my wonderful parents, Leyland and Saundra

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CHAPTER I

INTRODUCTION

The need for, and importance of, teams and teamwork has continued to grow as organizations of all types are facing problems and tasks too complex, dynamic, and demanding for individuals to handle independently (Modrick, 1986; Salas, Dickinson, Converse, & Tannenbaum, 1992). Global competition, work-force changes, technological developments, and other factors have led both public- and private-sector organizations to rely on teams for achieving cost-effective, quality products and services (Ilgen, Major, Hollenbeck, & Sego, 1993; Page & Nilan, 1994; Parker, 1991; Salas et al., 1992). Consequently, teamwork has become a major emphasis of many organizational training programs, and is a fundamental concept in the Total Quality Management (TQM) movement that is sweeping the nation and the world.

The ability to work effectively in teams is viewed as a primary, requisite skill by most of today's businesses. In fact, research conducted by the U.S. Department of Labor, as part of the Secretary's Commission on Achieving Necessary Skills (SCANS), revealed that teamwork is considered the single most important competency or skill that new hires should possess for success in organizations in the year 2000 (Korte, 1994; U.S. Department of Labor, 1992). Likewise, a

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The Publication Manual of the American Psychological Association (3rd ed.) was used as a model for the formatting of this dissertation.

recent survey of approximately 300 Human Resource (HR) professionals indicated that team development is one of the most important HR issues for the 1990s (Flynn, 1994). Specifically, 10.6% of those surveyed indicated that it was the most important issue for the 1990s, ranking only behind health care (15.1%), downsizing (11.3%), and cultural diversity training (11.0%).

Despite the perceived importance of teams and teamwork, however, effective teamwork will not just happen. As Hackman (1990) stated, a team must be built and managed to reap the benefits of teamwork; simply calling a set of people a team or encouraging them to work together is insufficient. Therefore, the issue becomes one of knowing how to effectively design, train, and manage teams. Unfortunately, despite extensive research conducted on teams and teamwork over the past several decades, few theoretically-driven, empirically-based guidelines or prescriptions for designing, training, managing, or evaluating teams have evolved (Freeberg & Rock, 1987; Salas, 1993).

It is suggested here that research focusing on team leadership may have great potential value for improving the current state of affairs. For example, because team leaders have primary responsibility for team management and maintenance, their selection, training, and subsequent performance are crucial to team success (Oakland, 1989). In other words, effective team leadership is an essential

component of effective overall teamwork. Consequently, if research were able to identify and classify the components (e.g., behaviors, traits, knowledge, skills, abilities) of effective team leadership in various team contexts, then many of the critical aspects of how to design, train, manage, and evaluate various teams would be identified. Thus, if it holds that team leadership is critical to team effectiveness, then understanding the nature of effective team leadership can lead to leadership-oriented prescriptions for designing, managing, and training effective teams.

The Important Role of Team Leadership

Team Leadership and Team Effectiveness

The importance of team leadership and the link between team leadership and team effectiveness has been noted by a number of researchers. For example, Ginnett (1988, 1990) stated that effective teamwork requires effort by everyone, especially the team leader. Alternately, many TQM proponents have suggested that the vast majority of ineffective teamwork and team failures may be attributed to management or leadership problems and not the individual team members (Oakland, 1989). According to Larson and LaFasto (1989), leadership is more than just influencing team effort; effective team leadership does, in fact, fundamentally change what team effort is all about. Burgess, Riddle, Hall, and Salas (1992) further explicated the relationship between leadership and team effectiveness,

stating that "effective team leader behaviors will lead to effective team performance, and ineffective team leader behaviors will lead to ineffective team performance" (p. 6). Likewise, Pratt and Jiambalvo (1981) suggested that team effectiveness cannot be maximized without addressing issues of leadership behavior. Finally, Stewart and Manz (1994) stated that the benefits to be derived from teams are contingent on leader behavior--ineffective leadership will surely inhibit team success, whereas effective leadership is an essential component of successful teams.

In general, a review of the team literature suggests that team leadership is one of the most critical ingredients in effective team performance, impacting all team processes, both directly and indirectly (Burgess et al., 1992; Domer, 1974; Ilgen et al., 1993; Klimoski & Jones, 1994; Kolb, 1992; Komaki, Desselles, & Bowman, 1989; Larson & LaFasto, 1989; Pratt & Jiambalvo, 1981; Smith, Salas, & Brannick, 1994; Stewart & Manz, 1994; Swezey & Salas, 1992). As such, Ilgen et al. (1993) emphasized that, "as we consider work teams and research on them in the 1990s, we cannot overlook the role of leaders and leadership" (p. 248). Unfortunately, previous team research largely has overlooked the role of team leadership. Thus, despite the generally regarded importance of team leadership in building and managing an effective team, little research has actually been conducted to determine the components of effective team leadership. As a result, little is known about the true

nature of team leadership.

Team Leadership: A Largely Neglected Topic

While a great deal of research has focused on the general phenomenon of leadership, very little research has focused on the unique characteristics of team leadership. In fact, the critical differences between supervising individuals within teams and supervising individuals as individuals has been largely neglected (Komaki et al., 1989). Likewise, nearly all leadership models and theories emphasize only one-on-one interactions and fail to incorporate interdependent tasks (Komaki et al., 1989). That is, explicit attention rarely is given to how leaders should handle interdependent team tasks as opposed to independent group tasks (Komaki et al., 1989).

Despite the relative paucity of research on the topic, the research that has investigated team leadership (most of which has been conducted quite recently) provides an important base for continued and improved efforts at understanding the phenomenon. As a result, the team leadership literature is reviewed and critiqued below.

Review of the Team Leadership Literature

This review is divided into two major sections. The first section addresses the findings and conclusions of research focusing on team leadership behaviors, especially those behaviors associated with effective team leadership and effective team performance. The second section addresses research focusing on the traits (e.g., leadership

style or orientation, personality, general abilities) of team leaders.

Team Leadership Behaviors

Reviews. Burgess et al. (1992) conducted a thorough review of the literature related to team leadership in stressful situations in order to identify specific team leader behaviors that influence team performance under stress. From the 13 studies deemed relevant, Burgess et al. identified behaviors or principles related to both effective and ineffective team leadership in stressful team situations. The team leader principles found to be effective under stress included: (a) accepting input from other team members; (b) collecting performance information; (c) giving immediate feedback; (d) planning, coordinating, and structuring the team; (e) using goal emphasis, interaction facilitation, and work facilitation; (f) being perceived as approachable and unintimidating; (g) using strategic communication to prepare for upcoming crises; and (h) providing justifications and explanations for actions and decisions made. Alternately, the team leader principles found to be ineffective included: (a) being unapproachable and intimidating to team members; (b) not collecting performance information; (c) not giving feedback; (d) inability to coordinate team members to work together; (e) disjointed communications; and (f) failing to or having difficulty with planning for future problems.

It also should be noted that Burgess et al. found only

weak or nonexistent relationships between leader traits and team performance under stress. Accordingly, Burgess et al. suggested the need to take a behavioral approach toward the study of team leadership in stressful situations. It is important to note the situational specificity of this conclusion, however. In other words, while it may be true that team leader traits have little impact on team performance under stress, it would be inappropriate to suggest that team leader traits are irrelevant in all team situations. Likewise, it would be inappropriate to disregard traits when studying team leadership in other contexts.

Swezey and Salas (1992) assembled a set of team process guidelines based on a review of previous team research. Among these guidelines were 13 leadership guidelines based on research and recommendations from seven sources. The team leadership guidelines were as follows:

1. Every member should recognize when he or she is the team leader or is expected to assume a leadership position.

2. Every team member should recognize when the team leader is unable to lead the team.

3. Every team member should recognize the authority of the team leader.

4. Reluctance by members to assume control when the team leader is unable to do so, can lead to overall failure of the team's mission.

5. Team leaders should be trained on or acquainted with

the details of the team's operation and the individual tasks required of each member.

6. Team leaders should keep the team focused on the task at hand.

7. Team leaders should ask for input and discuss potential problems.

8. Team leaders should verbalize their plans for achieving the team goal.

9. Team leaders should be good communicators and keep the team informed about matters affecting team performance.

10. Team leaders provide an important need for members by engaging in leader behaviors.

11. Team leaders typically engage in more initiating structure as team size increases.

12. Team leaders should recognize that team skills are at least as important as task skills.

13. Team leaders should be provided with supplemental training (beyond that provided to other members) in team performance concepts.

The implication was that following these guidelines would result in effective team leadership and subsequently effective team performance. However, it should be noted that some of the guidelines are more specific and prescriptive than others. For example, guidelines 7 and 8 give specific suggestions on how team leaders should behave, whereas guidelines 10, 12, and 13 are more generic conclusions regarding team leadership.

In addition to the 13 leadership guidelines, Swezey and Salas presented five recommendations on how team training should address team leadership. In particular, they recommended that:

1. Team leadership training should be skill based, reflecting the critical skills and behaviors appropriate for the team's task requirements.

2. Team training should include discussions about the expectations the members and leader have for one another.

3. Team training should address specific means through which both the leader and the team can monitor and enhance communication.

4. Leaders should be trained to exhibit behaviors that cultivate the team members' confidence in the leader (e.g., assertiveness when necessary, initiation of task structure, consideration of others' viewpoints).

5. Training should familiarize leaders with the activities and functions of all members or at least specify how leaders can familiarize themselves; ideally the leader should be competent in all member functions and activities to the extent possible.

Recently, Stevens and Campion (1994) conducted what they considered a thorough and content valid survey of the team-related literatures in an attempt to generate a domain of individual-level, team member KSAs. While the effort was not focused exclusively on team leader KSAs, the findings do provide information useful for understanding team leadership

given that the leader is often a member of the team. The review led to the identification of two main KSA areas--interpersonal KSAs and self-management KSAs. Interpersonal KSAs included: (a) effective interpersonal communication characterized by mutual respect, appropriate and timely sharing of information, and genuine solicitation of others' feedback and opinions; (b) conflict management and conflict resolution skills; and (c) collaborative problem-solving skills characterized by encouraging group discussions, facilitating collective decision making, and considering the contributions of all members. Self-management KSAs included: (a) goal setting and performance management skills characterized by setting clearly-defined and difficult goals, obtaining goal acceptance, and monitoring progress toward goal attainment; and (b) the ability to plan, coordinate, integrate, and sequence tasks and information as well as allocate individual members to specific tasks, duties, and role assignments.

Klimoski and Jones (1994) reviewed the relevant team and staffing literatures to develop a model and recommendations for staffing teams. With respect to team leadership, Klimoski and Jones suggested that the general capabilities or characteristics that should be considered in staffing the role of team leader are process management skills, project management skills, work style, and general intellective skills.

Cannon-Bowers, Tannenbaum, Salas, and Volpe (1994)

reviewed the relevant team literature to develop recommendations for team training. Towards that end, they identified a set of eight, "core" skill dimensions common to all teams. According to Cannon-Bowers et al. the eight skill dimensions, one of which was team leadership, should be addressed in any training program aimed at improving team performance. With respect to the team leadership dimension, Cannon-Bowers et al. identified three primary, requisite skills: (a) task structuring (delegating and assigning tasks, managing and distributing resources, directing performance, and establishing priorities), (b) mission analysis (planning, strategizing, and evaluating processes and outcomes), and (c) motivating others (leadership control, goal setting, goal orientation, and drive to completion).

Studies of specific teams. Domer (1974) assessed the impact of leader behavior on the effectiveness of dental teams. Leader behavior was assessed by means of member ratings on a BARS form consisting of nine behavioral dimensions. Team effectiveness was determined by team productivity (i.e., number of dental procedures per hour), member job satisfaction (i.e., Job Descriptive Index ratings for satisfaction with work, supervision, and co-workers), and an overall effectiveness rating provided by two independent observers according to a one-item effectiveness scale. Results showed that leader behavior accounted for a significant percentage of the variance in each of the

measures of team effectiveness, with each of the nine behavioral dimensions correlating significantly with at least one effectiveness measure. This study provides strong support for the notion that leader behavior has a powerful impact on overall team performance.

Pratt and Jiambalvo (1981) investigated the relationships between leader behaviors and the performance of audit teams. Overall team performance was rated by the department manager according to a 7-point scale ranging from poor to outstanding. Team leader effectiveness was also rated by the department manager. However, individual auditor performance was rated by the auditor-in-charge (i.e., the team leader) according to a similar 7-point scale. The results identified a number of team leader behaviors that related, either directly or indirectly, to team performance. Specifically, the following team leader behaviors were significantly correlated with effective team performance: (a) allowing member innovation, (b) providing frequent positive reinforcement and infrequent negative reinforcement, (c) providing timely feedback, (d) demonstrating consideration for members' personal needs, and (e) managing task assignments and timetables or deadlines to maximize efficiency and prevent overload. Furthermore, each of these leader behaviors was positively correlated with member satisfaction, motivation, and the level of confidence and trust among members. In turn, satisfaction, motivation, and trust correlated with overall team performance.

Perhaps the most interesting and important finding of the study was that leader behavior had little apparent impact on individual member performance but was significantly related to overall team performance. Of equal interest, however, was the lack of significant relationship between any individual member's performance and overall team performance. Pratt and Jiambalvo (1981) suggested the results imply that factors other than individual performance (such as trust and mutual confidence) play a significant role in determining team performance, and that leader behaviors can influence these factors. However, the findings also may be the result of a methodological artifact. That is, the performance differences may be attributed to the fact that different raters were used to assess individual member performance (rated by the team leader) and overall team and team leader performance (rated by the manager). As such, caution must be taken when considering the findings regarding the role of individual performance and the impact of leadership on individual performance. Nonetheless, the study does provide additional support for the importance of leadership in team performance, and suggests that effective leadership is a crucial component of effective team performance.

Shiflett, Eisner, Price, and Schemmer created a taxonomy of team functions based on an intensive study of command and control teams (cited in Dieterly, 1988). While the taxonomy was not specifically focused on the functions

of the team leader, it consisted of functions commonly associated with leadership. That is, while the functions may apply to any and all team members, they seem particularly oriented toward the team leader. The taxonomy included the following five functions:

1. Orientation Functions: (a) information exchange regarding members resources and constraints, (b) information exchange regarding team tasks and goals/mission, (c) information exchange regarding environmental characteristics and constraints, and (d) priority assignment among tasks.

2. Resource Distribution Functions: (a) matching member resources to task requirements, and (b) load balancing.

3. Timing Functions: (a) general activity pacing, and (b) individually oriented activity pacing.

4. Response Coordination Functions: (a) response sequencing, and (b) time and position coordination.

5. Motivational Functions: (a) development of team performance norms, (b) generating acceptance of team performance norms, (c) establishing team-level performance-reward linkages, (d) reinforcement of task orientation, (e) balancing team orientation with individual competition, and (f) resolution of performance-relevant conflicts.

Oakland (1989) specifically focused on Quality Improvement Teams in his discussion of Total Quality Management. Accordingly, he provided recommendations on what leaders of Quality Improvement Teams (QIT) should do to

foster team effectiveness. Specifically, Oakland suggested that QIT leaders should: (a) clearly state the team's objective; (b) create a climate for creativity; (c) encourage all team members to speak out and contribute their own ideas; (d) allow and recognize differing points of view and ideas to emerge; (e) remove barriers to idea generation; (f) clarify expectations of the members in terms of both the team's overall goal and individual tasks; (g) mediate problems and interpersonal conflicts; (h) discourage uncooperative behaviors; (i) support all team members in their attempts; and (j) provide regular feedback to the team regarding progress toward the objective. While these leader behaviors may indeed improve the performance of QITs, it should be noted that Oakland's recommendations are based on experience and not empirical research.

Parker (1991) focused his attention on understanding business teams. As Oakland did, Parker relied heavily on experience and case studies rather than empirical research. Nonetheless, Parker provided some important insights into understanding team leadership. For example, he stated that team leaders have two types of leadership responsibilities--task responsibilities and process responsibilities.

Task responsibilities are actions that help the team reach its goal, accomplish an immediate task, make a decision, or solve a problem. Task responsibilities include: (a) initiating (proposing tasks, goals, or actions; defining group problems; suggesting a procedure to

use); (b) offering facts (expressing a feeling, giving an opinion); (c) seeking information (asking for opinions, facts, feelings/reactions); (d) clarifying (interpreting or elaborating ideas, asking questions to gain understanding); (e) coordinating/summarizing (assembling related ideas, offering decisions, restating suggestions); and (f) reality testing (critiquing, testing an idea against data).

On the other hand, process responsibilities involve showing team members how to go about accomplishing tasks. Process responsibilities include: (a) harmonizing (reconciling differences/disagreements, reducing tensions); (b) gatekeeping (keeping communication channels open, facilitating participation); (c) consensus testing; (d) encouraging; and (e) compromising.

Parker also suggested that the team leader's behavior is crucial in building trust and opening communication. To do so, Parker suggested that the leader must first encourage discussion of problems and key issues and then model a response that is nonjudgmental. Second, the leader should support subgroups working together. According to Parker, this leads to shared leadership whereby all members take responsibility for ensuring the success of the team by performing leadership functions on an as-needed basis. Furthermore, Parker stated that shared leadership empowers the team and may, in fact, be the key to team success.

McGarvey (1991) also addressed the nature of effective leadership in business teams. Specifically, McGarvey (1991)

suggested that effective team leaders: (a) allow and encourage members to advance opinions, ideas, and concerns; (b) confront poor performers; (c) show respect for members and their skills; (d) trust members and engender trust among members; (e) engender team commitment; (f) motivate members; (g) empower team members; (h) clarify expectations; and (i) actively participate in the activities of the team. It should be noted that McGarvey's suggestions were not based on empirical research, but rather the experience and opinions of various consultants specializing in team-building.

Dickinson et al. (1992) focused on the performance of Navy tactical teams. By means of critical incident interviews and retranslation, they identified effective team leadership behaviors. In particular, Dickinson et al. found that effective tactical team leadership involves: (a) encouraging team members to make appropriate decisions on their own, (b) providing direction and support for members, (c) explaining to team members exactly what is expected of them, (d) monitoring or reviewing the situation and taking action when the team becomes overwhelmed, (e) interjecting only when problems arise and allowing members to function independently to increase self-confidence, (f) providing all pertinent information to members and generally managing team communications, and (g) assigning team members with significant levels of responsibility to increase autonomy and skill.

Smith, Salas, and Brannick (1994) focused on flight crews and investigated the effects of leader behavior in a pre-task brief on team climate perceptions and teamwork behaviors. Results provided evidence that team leaders have a causal impact on compensatory team behaviors (e.g., error correction, backup behavior) through their influence on team members' perceptions of team climate. According to Smith et al., the findings support the notion that creating a climate for teamwork is one of the most critical tasks that a leader must perform. That is, leaders can set the stage for effective teamwork quickly and early on by consciously managing team climate (e.g., by soliciting and reinforcing effective teamwork behavior).

Hackman (1986) addressed the unique phenomenon of leaders and leadership in self-managing, self-designing, and self-governing units. According to Hackman (1986), in self-managing units, members have responsibility not only for performing the tasks but also for monitoring and managing their own performance. In self-designing units, members have authority to modify the design of the unit and the context in which it operates. Finally, in self-governing units, members decide what is to be done, structure the unit and context, manage their own performance, and actually perform the work. Beyond these general definitions, however, Hackman (1986) focused on self-managing units only.

According to Hackman (1986), the following are the behavioral signs of effective self-management: (a) members

take personal responsibility for outcomes; (b) they continuously monitor their own performance and seek data and feedback on their progress; (c) members manage their own performance, making improvements and taking corrective action at their own initiative; (d) members actively seek guidance and resources from the organization as needed; and (e) members help one another to improve overall unit performance while ensuring that their own responsibilities are being met. In addition, Hackman (1986) stated that to be effective, self-managed units need: (a) a clear, engaging direction; (b) an enabling structure; (c) a supportive organizational context; (d) available, expert coaching; and (e) adequate material resources.

Hackman (1986) explained that even though self-managing teams essentially lead or manage themselves, they still may have a leader. In self-managed teams, the "leader" has the responsibility of leading the members to lead themselves. More precisely, Hackman (1986) states that "the critical leadership functions for a self-managing unit are those activities that contribute to the establishment and maintenance of favorable performance conditions" (p. 120). This involves two key functions. First, the leader must monitor the situation by obtaining and interpreting data about performance conditions and events that might affect the team. Second, the leader must take action (either internal or external to the team) to create or maintain favorable performance conditions.

It should be noted that the units Hackman (1986) refers to may or may not be interdependent teams distinct from groups or other collectives. Therefore, caution should be taken in applying these comments to the team literature.

Stewart and Manz (1994) also focused on the role of leadership in self-managing work teams. As a guide to understanding effective and ineffective leadership in self-managing teams, they created what they referred to as a typology of team leadership. However, what they actually developed was a four-celled matrix of managerial leadership drawn from Bass and Stogdill's Handbook of Leadership. The matrix was designed with leadership style on one axis (ranging from autocratic to democratic) and leader involvement on the other axis (ranging from active to passive). Their use of the matrix consisted of describing the likely impact that the leader behaviors representative of each cell would have on the effectiveness of self-managing teams. In particular, they concluded that both active and passive forms of autocratic leadership will inhibit the success of self-managing teams. In addition, they stated that the most effective leadership in self-managing teams will begin as active-democratic leadership focused on developing self-regulation skills in the team members. The specific leadership behaviors characterizing active-democratic leadership included: (a) guidance and encouragement of team building activities, (b) creating a team-oriented culture, (c) delegating responsibility, and

(d) teaching and reinforcing self-regulation skills. Once the self-regulation skills are developed, however, effective leadership must transition into a passive-democratic form characterized by modeling, boundary spanning, and assisting on an as-needed basis.

Although their conclusions regarding effective leadership in self-managing teams may be correct, caution must be taken in applying the work of Stewart and Manz (1994) to the team leadership literature. As mentioned, the "typology" which served as the basis of their research was developed from research on managerial leadership, not team leadership. Furthermore, their conclusions about effective and ineffective team leadership are simply propositions or hypotheses based on the matrix, none of which were tested in actual self-managing team situations.

Multi-team comparative studies. Komaki et al. (1989) investigated the relationship between the effectiveness of sailing teams and the skipper's (i.e., team leader's) degree of monitors and consequences. Team effectiveness was based on an outcome measure of series standing and a judgmental evaluation of coaches' ratings and rankings. Monitors were defined as behaviors related to collecting performance information (e.g., sampling the work, asking for self-reports), and consequences were defined as behaviors indicating knowledge of performance (e.g., recognizing good performance, providing feedback, noting corrections). Results showed a significant relationship between

performance based on series standing and the frequency of both monitors and consequences. A significant relationship also was found between performance based on the ratings and rankings and the frequency of consequences. As a result, Komaki et al. concluded that knowing the frequency with which team leaders monitor and provide consequences allows for predictions of leader success. That is, the more frequently leaders provide monitors and consequences, the more successful they are.

Perhaps of even greater interest for the present study was Komaki et al.'s comparison of the behavior of the team leaders (i.e., skippers) with that of non-team leaders (i.e., managers from various organizational settings). They found that, compared to managers, team leaders spent significantly more time collecting performance information from (monitors), providing feedback to (consequences), and giving instructions to (antecedents) their teams or groups. This supports the notion that the behaviors constituting effective leadership in teams differ from those constituting effective leadership in groups.

Kolb (1992) studied teams engaged in creative endeavors (e.g., R&D teams) and found that a key function of the leaders of such teams is to fulfill a boundary management role for the team, ensuring that the team receives necessary resources and support from the organization while allowing members freedom from organizational constraints so they may concentrate on team activities. The specific behaviors

found to be significantly correlated with research team performance were: (a) speaking and acting as the representative for the team, (b) maintaining cordial relations with and having influence with superiors, (c) keeping the team in good standing with higher authority, (d) exhibiting trust by giving team members significant levels of responsibility, and (e) providing team members with the necessary autonomy to achieve results.

More importantly, however, was the fact that none of these behaviors were correlated with team performance of the non-research teams included in the study. This supports the idea that behaviors constituting effective leadership may differ from one team or team "type" to another. In other words, because not all teams are alike, leadership requirements may very well differ from one type of team to another (Kolb, 1992). On the other hand, the fact that there were no significant differences between the research and non-research teams on the other leadership behaviors that were measured suggests that not all effective leader behaviors are unique to the type of team.

Unlike most research on teams and team leadership, Larson and LaFasto (1989) investigated a large and diverse sample of teams or team types. As a result, their findings may be more generalizable than those of many previous studies with a more narrow focus. Their goal was to determine what makes for an effective team; and by means of a critical incident interview process, Larson and LaFasto

were able to identify what they considered the eight characteristics of effectively functioning teams. Among these eight characteristics, and considered one of the most important, was principled leadership.

In general, Larson and LaFasto found that effective team leaders act as change agents and engage in transformational leadership practices. More precisely, their research indicated three consistent characteristics of effective team leaders:

1. They establish a vision of the future. That is, they provide the team with a clear, elevating, and worthwhile goal.

2. They create change, helping the team move from things as they exist to the desired state or goal. In particular, they have a plan or agenda, take action or set plan in motion, and show members that change is possible.

3. They unleash the energy and talents of the members. That is, they motivate members into action.

Beyond these general characteristics of effective team leaders, Larson and LaFasto also attempted to identify specific behaviors related to effective leadership in all teams. However, they were "not convinced that the behaviors of specific leaders can be generalized to other leaders" (p. 122). So rather than citing a litany of leaders and describing how they performed, they undertook a content analysis of their data in order to identify the common behaviors of effective and ineffective leaders. The content

analysis supported the three characteristics, but the single most distinguishable feature of effective leaders was their ability to establish, and lead by, guiding principles or day-to-day performance standards.

It was consistently found that in effective teams, the leader managed principles, and the principles managed the team. The principles essentially were the expectations that the leaders had of the team members. In particular, it was found that effective team leaders expected members to:

1. Demonstrate a realistic understanding of his/her role and accountabilities.
2. Demonstrate objective, fact-based judgments.
3. Collaborate effectively with other team members.
4. Make the team goal a higher priority than any personal objective.
5. Demonstrate a willingness to devote whatever effort is necessary to achieve team success.
6. Be willing to share information, perceptions, and feedback openly.
7. Provide help to other team members when needed and appropriate.
8. Demonstrate high standards of excellence.
9. Stand behind and support team decisions.
10. Demonstrate courage of conviction by directly confronting important issues.
11. Demonstrate leadership in ways which contribute to the team's success.
12. Respond constructively to feedback from others. (Larson & LaFasto, 1989, p. 124)

In addition to guiding the team by principles, effective team leaders were guided by principles. Specifically, the effective team leaders were guided by the following principles:

1. Avoid compromising the team's objective with political issues.

2. Exhibit personal commitment to the team's goal.

3. Do not dilute the team's efforts with too many priorities.

4. Be fair and impartial toward all team members.

5. Be willing to confront and resolve issues associated with inadequate performance by team members.

6. Be open to new ideas and information from members.

7. Provide a supportive decision-making environment by:

a) trusting team members with meaningful levels of responsibilities,

b) providing team members the autonomy necessary to achieve results,

c) presenting challenging opportunities that stretch the abilities of team members,

d) recognizing or rewarding superior performance, and

e) standing behind the team and supporting it.

Larson and LaFasto (1989) summarized their findings by concluding that:

> Whether it was in the context of college or professional football, mountain climbing, cardiac surgery, project teams, or executive management teams, the following observation held true: Effective leaders bring out the leadership in others. Effective leaders give team members the self-confidence to act, to take charge of their responsibilities, and make changes occur rather than merely perform assigned tasks. In short, leaders create leaders! (p. 128)

Similar breadth of coverage can be seen in Hackman's (1990) book entitled, Groups That Work (and Those That Don't), which consists a collection of case studies from a diverse sample of teams. Despite the relative diversity of

the teams, Hackman (1990) grouped the case studies according to seven general team types--top management teams, task forces, professional support teams, performing groups, human service teams, customer service teams, and production teams. Furthermore, the case studies comprising each of the general team types were summarized by the contributing authors (e.g., Eisenstat and Cohen summarized their work on top management teams). Each of the summaries provided conclusions and recommendations regarding what makes teams of that particular type effective or ineffective. It should be noted that the summaries presented here focus only on those conclusions and recommendations regarding team leadership.

With respect to top management teams, Eisenstat and Cohen (1990) reached two primary conclusions. First, for a team to be effective, the leader must establish clear boundaries for the team and its work. Second, they stated that level of trust is directly related to team effectiveness and the team leader's behavior can critically affect the level of trust. As a result, they recommended that leaders actively work to build trust among all members of the team.

According to Gersick and Davis-Sacks (1990), leaders of task forces are typically not members of the task force but rather external managers. As such, the leader of a task force often has to perform a balancing act. In particular, he or she has the critical roles of: (a) managing

uncertainty, (b) buffering the team members from outside influences while ensuring they remain sensitive to outside concerns, (c) influencing and guiding the team while remaining open to its input, and (d) managing the heterogeneity that typically exists in task forces. To the extent that the leader can perform all these roles, the team will be effective.

Davis-Sacks, Denison, and Eisenstat (1990) concluded that leaders of professional support teams (e.g., maintenance teams, tracking teams, computer system support teams) must help team members balance their roles of skilled professional and organizational member. In particular, they suggested that effective leaders of professional support teams push members toward organizational engagement by locating the team close to line activities, rotating members through line operations, and so on.

Butterworth, Friedman, Kahn, and Wood (1990) suggested that the nature of leadership in performing groups (e.g., groups and teams that produce performance rather than a tangible product or service such as musical ensembles, theatre companies, sports teams) depends on the structure of the group and formality of the leadership. In particular, they stated that in teams having a central authority structure, the leader is the most salient feature of the group with the responsibility of coordinating the entire performance. As a result, successful leaders of such groups are generally imposing and directive. Furthermore, these

leaders may be considered external to the team itself. On the other hand, Butterworth et al. indicated that performing groups without central authority structures (e.g., intramural athletic teams) can be considered self-managing teams whose success depends on their ability to balance playfulness with order and control. Leadership in these types of performing teams is internal. In other words, the leadership comes from all members of the team or from a designated leader who is also a member of the team.

In addition to these general conclusions regarding leadership in performing teams, a number of specific conclusions regarding athletic teams merit consideration. In particular, Kahn (1990) found that a key function of leadership on an athletic team is to set game strategy. In turn, those who call the plays are, in fact, the team leaders--whether officially designated as such (coach and/or captain) or not (any team member). For example, an intramural basketball team in Kahn's study had a number of different leaders throughout the season, based simply on who was guiding the team at the time. On the other hand, Kahn found that a varsity baseball team was led solely by the coach who had all the authority and used it to dictate game strategy. Because strategic leadership provided both opportunities for and constraints upon the emergence of informal leadership, it is an important factor to consider in understanding the differences between various performing teams. Furthermore, many performing teams have few

organizational structures and systems to support, constrain, or shape the team's functioning. Instead, it is a combination of the performance and the leadership that directs such teams. Members are intrinsically motivated to perform and perform well. However, leadership also becomes more important in such informal settings because of the absence of a strong organizational context. Therefore, team leaders must provide virtually all the functions that would otherwise be handled by the context. There is not, however, a connection between management structure and success. Both manager-led and self-managed forms can either succeed or fail.

Perkins, Shaw, and Sutton (1990) concluded that "leadership strategies that foster the autonomy of human service teams and help members feel that, within limits, they really can make a difference may be among the most potent and useful interventions that can be made to improve the effectiveness of such teams" (p. 357). In addition, leaders of human service teams must allow and encourage all team members, regardless of level, to express opinions that are in the member's realm of expertise or understanding.

According to Saavedra, Cohen, and Denison (1990), leaders of customer service teams often have little direct contact with the team because the team is in the field. As a result, leaders of such teams often lack data on what members do or how well they do it. To avoid the potential problems of this structure, leaders should give the teams

full autonomy for work outcomes and in fact create self-managing teams. Thus, the team would specify its own means for accomplishing organizational directions or objectives and members would manage their own boundaries. Leaders would emphasize their expectations for the teams, recognize excellent and poor team performance, and generally guide the team to success through coaching and counseling.

Hackman (1990) summarized the case studies of production teams and concluded that leaders of production teams must balance the fine line between: (a) overprotecting and limiting the growth of the team by buffering it from all outside involvement, and (b) providing no boundary management and having the team fail due to overextension and spending too much time on inappropriate things. Ginnett (1990) specifically commented on the behaviors exhibited by captains of airline cockpit crews (a type of production team according to Hackman). In particular, Ginnett found that effective captains consistently exhibited the following behaviors: (a) explicitly discussing tasks that require coordination between cockpit and cabin, (b) defining and expanding crew boundaries, (c) explicitly setting norms for crew behavior, and (d) managing the dynamics surrounding the authority inherent in the captain's own role.

Hackman (1990) concluded the book by summarizing the case studies and attempting to generalize the characteristics of effective and ineffective teams. From

these case studies, Hackman concluded that leaders must take explicit action to: (a) establish team boundaries; (b) define the team's tasks and goals, emphasizing that all members are collectively responsible and accountable for achieving the goal; and (c) give members authority to manage internal processes and external relations. Leaders should set a clear, engaging direction for the team and establish broad constraints or parameters for team behavior. However, the team itself should be given full authority to determine the means by which it accomplishes its work.

Leader Traits

Leadership style. Tziner and Vardi (1982) found that the performance and effectiveness of tank crews were highest when there was either high team cohesion with a leadership style reflecting both task and people orientation, or low team cohesion with a people-oriented leadership style.

Lawental (1987) investigated the relationship of leadership style and team performance in interdisciplinary drug and alcohol treatment teams. Results showed a significant relationship between leadership style and team performance. In particular, teams led by executive and developer styles scored higher than all other styles. According to Lawental, leadership style is a useful construct for understanding and training team leaders.

According to Cohen's (1990) case study of top management teams, strong directive leadership is often required in crisis situations, whereas a more participative

style may be required once stability is achieved. Again, this suggests that the "appropriate" leadership style is contingent on the situation. However, as Cohen added, it can be extremely difficult to change styles of leadership to meet the situational needs--even if the leader knows which style to change to.

Finally, it has been suggested that transformational leadership is more effective than transactional leadership in team situations (Burgess, Riddle, Salas, Cannon-Bowers, & Hall, in press). In fact, recent research has found that, in both military and commercial environments, those team leaders judged to be most effective displayed more transformational characteristics than leaders judged to be less effective (Hater & Bass, 1988; Yammarino & Bass, 1991). Transformational leadership is comprised of three primary components--charismatic leadership, intellectual stimulation, and individualized consideration--and is characterized by a team-level focus, motivating members toward a common goal, and encouraging mutual support. Charismatic leadership is characterized by inspiring a strong sense of faith and loyalty for the team and its mission and developing a sense of self-leadership. Intellectual stimulation involves encouraging creativity and innovation. Finally, individualized consideration involves the development of mentoring relationships where the unique potential of individuals is recognized and encouraged through challenging work assignments and high levels of

responsibility.

Leader personality. After reviewing the relevant literature on leader traits and team performance, Morgan and Lassiter (1992) concluded that there is "a lack of consistent evidence linking leader personality and team performance" (p. 85). However, they added that one reason significant relationships are rarely found between personality variables and team performance may be the weak manipulation of leadership in many studies, particularly laboratory-based studies. As a result, they suggested that "in operational settings, where leadership is relatively enduring and the leader possesses the authority to actually control team processes, the effects of the leader's personality tends to have a greater influence on team performance" (p. 85).

Leader abilities. Morgan and Lassiter (1992) also reviewed research examining the relationship between leader abilities (general and task-specific) and team performance. They concluded that the impact of leader abilities was unclear due to inconsistent findings. As with other leadership traits (e.g., leadership style, personality), it appears that the relationship between leader abilities and team performance is contingent on the situation or context. For example, research has found that under stressful situations there is no significant relationship between leader intelligence (i.e., general cognitive ability) and team performance (Fiedler, 1986, 1987; Fiedler & Leister,

1977; Vecchio, 1990). However, a significant relationship has been found between intelligence and team performance when the leader is directive, the team is supportive, and the situation is low stress (Fiedler, 1987), and when the leader possesses a high degree of motivation and experience (Fiedler & Leister, 1977).

Summary and Critique of Team Leadership Research

In an attempt to summarize and clarify the research conducted on team leadership, Table 1 groups the studies according to the major characteristics found to be associated with effective leadership. Table 1 shows some agreement as to the characteristics or components of effective team leadership. For example, several studies indicated that fostering autonomy was an important factor. However, there appears to be an equal or greater degree of incongruity. This variability in what is considered important for effective team leadership may be attributed, in part, to the various methodological limitations associated with much of the research on team leadership.

Problems with Existing Research

Not only is research limited on the topic of team leadership (i.e., there is a paucity of research on team leadership relative to research on teams and organizational leadership), but most of the studies that have been done suffer from certain methodological limitations. First, most of the studies focus on leadership in only one situation or one type of team. For example, Burgess et al. (1992)

Table 1

Characteristics of Effective Team Leaders and Leadership: A Summary of Team Leadership Research

Behaviors:	
1. Fostering autonomy/providing members with autonomy	Dickinson et al., 1992; Hackman, 1990; Kolb, 1992; Larson & LaFasto, 1989; McGarvey, 1991; Perkins et al., 1990; Saavedra et al., 1990
2. Analyzing results of mission or task	Cannon-Bowers et al., 1994
3. Managing and distributing resources; seeking resources from the organization	Cannon-Bowers et al., 1994; Hackman, 1986; Shiflett et al., 1982
4. Orienting members about tasks, goals, resources, and environmental influences	Shiflett et al., 1982
5. Delegating work; assigning members specific tasks, duties, or roles	Cannon-Bowers et al., 1994; Stevens & Campion, 1994
6. Recognizing the contributions of all members	Stevens & Campion, 1994
7. Fostering team commitment and obtaining goal acceptance from all members	McGarvey, 1991; Stevens & Campion, 1994
8. Exhibiting personal commitment to the team's goal	Larson & LaFasto, 1989
9. Giving regular, timely feedback	Burgess et al., 1992; Komaki et al., 1989; Oakland, 1989; Pratt & Jiambalvo, 1981
10. Accepting input from others; being open to new ideas and information; allowing and recognizing differing viewpoints	Burgess et al., 1992; Larson & LaFasto, 1989; McGarvey, 1991; Oakland, 1989; Stevens & Campion, 1994
11. Monitoring team performance; collecting performance information	Burgess et al., 1992; Dickinson et al., 1992; Hackman, 1986; Komaki et al., 1989
12. Justifying or explaining actions and decisions	Burgess et al., 1992
13. Designing, coordinating, and structuring the team	Burgess et al., 1992
14. Managing team communications	Burgess et al., 1992; Dickinson et al., 1992
15. Assigning members significant levels of responsibility	Dickinson et al., 1992; Kolb, 1992; Larson & LaFasto, 1989; Stewart & Manz, 1994

(continued)

Table 1 (continued)

16. Planning and coordinating team tasks; setting team strategy	Burgess et al., 1992; Kahn, 1990; Shiflett et al., 1982; Stevens & Campion, 1994
17. Defining and emphasizing the team's mission/goal/objective; setting clear, elevating, and worthwhile goals	Burgess et al., 1992; Cannon-Bowers et al., 1994; Hackman, 1990; Larson & LaFasto, 1989; Oakland, 1989
18. Verbally stating plans for achieving team goal	Swezey & Salas, 1992
19. Managing or directing team performance; taking action to prevent or correct problems, ensure efficiency, and ensure deadlines/goals are met; keeping the team focused on the task/goal	Burgess et al., 1992; Cannon-Bowers et al., 1994; Dickinson et al., 1992; Hackman, 1986; Pratt & Jiambalvo, 1981; Swezey & Salas, 1992
20. Creating a climate for creativity and innovation	Oakland, 1989; Pratt & Jiambalvo, 1981
21. Creating and managing a climate for teamwork by soliciting and reinforcing effective teamwork behaviors	Smith et al., 1994; Stewart & Manz, 1994
22. Encouraging all members to contribute ideas and make decisions	Dickinson et al., 1992; McGarvey, 1991; Oakland, 1989; Perkins et al., 1990; Stevens & Campion, 1994; Swezey & Salas, 1992
23. Encouraging open communication; encouraging members to discuss problems and voice concerns and opinions	Eisenstat & Cohen, 1990; Parker, 1991; Swezey & Salas, 1992
24. Creating change; helping the team move toward goal; removing barriers to goal attainment	Larson & LaFasto, 1989; Oakland, 1989
25. Clearly stating what is expected of the members	Dickinson et al., 1992; Ginnett, 1990; Larson & LaFasto, 1989; McGarvey, 1991; Oakland, 1989; Saavedra et al., 1990; Shiflett et al., 1982
26. Facilitating member interactions; managing or mediating problems & interpersonal conflicts; discouraging uncooperative behaviors	Oakland, 1989; Parker, 1991; Shiflett et al., 1982; Stevens & Campion, 1994
27. Facilitating group problem solving	Stevens & Campion, 1994; Swezey & Salas, 1992
28. Standing behind the team and supporting the efforts of all members; keeping the team in good standing with individuals outside the team	Dickinson et al., 1992; Kolb, 1992; Larson & LaFasto, 1989; Oakland, 1989; Parker, 1991
29. Participating in team activities; assisting the team in accomplishing its objective	Hackman, 1986; McGarvey, 1991; Parker, 1991
30. Instructing or training the team; showing members how to accomplish tasks	Komaki et al., 1989; Parker, 1991

(continued)

Table 1 (continued)

31. Building trust and mutual respect	Kolb, 1992; McGarvey, 1991; Parker, 1991; Pratt & Jiambalvo, 1981; Stevens & Campion, 1994
32. Facilitating development of shared leadership; creating leaders and developing leadership in all members	Hackman, 1986; Larson & LaFasto, 1989; Parker, 1991; Stewart & Manz, 1994
33. Recognizing/rewarding/reinforcing effective team performance	Komaki et al., 1989; Larson & LaFasto, 1989; Pratt & Jiambalvo, 1981; Saavedra et al., 1990; Shiflett et al., 1982; Smith et al., 1994; Stewart & Manz, 1994
34. Serving as the team representative; representing the team in various situations	Kolb, 1992
35. Taking responsibility for team outcomes	Hackman, 1986
36. Making all members collectively responsible and accountable for the team goal	Hackman, 1990
37. Motivating members to perform and perform well	Cannon-Bowers et al., 1994; Larson & LaFasto, 1989; McGarvey, 1991; Shiflett et al., 1982
38. Recognizing, confronting, and resolving inadequate performance by members	Larson & LaFasto, 1989; McGarvey, 1991; Saavedra et al., 1990
39. Modeling effective teamwork and leadership behaviors	Stewart & Manz, 1994
40. Coaching and counseling members	Saavedra et al., 1990; Stewart & Manz, 1994
41. Managing diversity/heterogeneity	Gersick & Davis-Sacks, 1990
42. Managing boundaries; buffering team from outside influences while ensuring team remains sensitive to outside concerns	Gersick & Davis-Sacks, 1990; Hackman, 1990; Kolb, 1992; Stewart & Manz, 1994
43. Engaging the team in organizational activities	Davis-Sacks et al., 1990
44. Imposing structure and coordinating all aspects of the team's performance	Butterworth et al., 1990
45. Supporting, constraining, and shaping team functioning in the absence of organizational structure	Kahn, 1990
46. Establishing and clearly defining team boundaries	Eisenstat & Cohen, 1990; Ginnett, 1990
47. Initiating structure as team size increases	Swezey & Salas, 1992

(continued)

Table 1 (continued)

Leader Traits:	
1. Being approachable to all members	Burgess et al., 1992
2. Fairness and impartiality	Larson & LaFasto, 1989
3. Intelligence in specific team situations	Fiedler, 1987; Fiedler & Leister, 1977
4. Directive leadership style in crisis situation	Cohen, 1990
5. Participative leadership style in stable situations	Cohen, 1990
6. Both task- and people-oriented leadership style	Lawental, 1987; Tziner & Vardi, 1982
7. Consideration; people-oriented leadership style	Pratt & Jiambalvo, 1981; Tziner & Vardi, 1982
8. Transformational leadership style	Burgess et al., in press; Hater & Bass, 1988; Larson & LaFasto, 1989; Yammarino & Bass, 1991
9. Team-oriented work style	Klimoski & Jones, 1994
10. Goal-oriented	Cannon-Bowers et al., 1994
KSAs:	
1. Ability and willingness of all members to assume control and take a leadership role	Swezey & Salas, 1992
2. Strong interpersonal communication skills	Stevens & Campion, 1994; Swezey & Salas, 1992
3. Strong process management skills	Klimoski & Jones, 1994
4. Strong project management skills	Klimoski & Jones, 1994
5. General intellective skills	Klimoski & Jones, 1994
6. Strong conflict management and conflict resolution skills	Stevens & Campion, 1994
7. Strong collaborative problem-solving skills	Stevens & Campion, 1994
8. Thorough understanding of team performance concepts	Swezey & Salas, 1992
9. Detailed knowledge of the team's operation and member's tasks	Swezey & Salas, 1992
10. Understanding that team skills are as important as task skills	Swezey & Salas, 1992

focused on team leadership in stressful situations, Oakland (1989) focused solely on Quality Improvement Teams, Domer (1974) looked at university dental teams, and Pratt and Jiambalvo (1981) investigated audit teams from regional accounting firms. Multi-team, comparative studies seem to be the exception rather than the rule. As a result, few generalizations can be made about team leadership from the research that has been conducted.

Second, many of these studies are based more on anecdotal or single case-study data than empirical investigation of team leadership. Related to the lack of empirical research is the problem of measurement. In other words, the use of anecdotal and case-study approaches to understanding team leadership prevents powerful and precise measurements that can lead to the identification of predictive or causal relationships.

Third, many of the empirical studies of team leadership used ad hoc groups and contrived teams created for the study, rather than intact teams. In addition, many of the studies were conducted in non-naturalistic (e.g., laboratory-based) settings, and involved noninterdependent problem solving tasks rather than truly interdependent team tasks.

Fourth, definitions of team leadership often are lacking or narrow, and several of the studies can be questioned with respect to whether they truly are focusing on the unique phenomenon of team leadership. That is, few

studies attempt to distinguish team leadership from general, managerial forms of leadership. The result of these various methodological problems is that our understanding of team leadership is limited and progress is hindered.

Although Morgan and Lassiter's (1992) review focused only on research related to team leader traits, their conclusions provide an appropriate summary of all team leadership research:

> Available data indicate that team performance may be impacted by leadership personality, ability, and/or style. The exact nature of these effects, however, are [sic] difficult to predict, the relationships are often complex, and there is little framework for organizing the available findings. Reasons for this situation include the fact that numerous definitions of leadership have been used, results have been compromised by weak leadership manipulations and other methodological problems, and leadership variables have been found to interact with task characteristics and the social climate of the team. Thus, there is little systematic basis for recommending the selection of team leaders. (p. 86)

As a result, they noted the need for a great deal more research concerning the issue of team leadership.

The limitations associated with existing team leadership research must be considered if progress is to be made. However, it is unlikely that the variance and incongruity found in Table 1 is due solely to methodological artifacts. Rather, it seems reasonable to suggest that: (a) there are different types of team leadership, (b) different teams and team situations call for different types of team leadership, and (c) effectiveness (for both leader and team) is dependent on correctly matching the appropriate

type of team leadership to the particular team situation. For example, the components of effective leadership in tactical teams under stress may be fundamentally different from the components of effective leadership in creative R&D teams. As a result, some discrepancy with respect to the components of effective team leadership is to be expected. In fact, Hackman's (1990) book provides support for this notion, showing that different types of teams often required different approaches to leadership. Likewise, Morgan and Lassiter (1993) noted that the importance or impact of various traits is contingent on the situation or context.

The question, therefore, arises as to how to progress. This is a formidable question given the general complexity of the team leadership phenomenon, the limited research on the topic, the problems associated with the existing research, and the apparent contingencies that determine effective forms of team leadership.

It is suggested here that the answer lies in the empirical development of a classification system of team leadership. Such a system could improve our understanding of the nature of effective team leadership and determine the various types of team leadership that exist. A classification system of team leadership could also help to overcome many of the problems of previous research efforts by providing a foundation and guide for appropriate generalizations and new predictions. For example, the system would allow researchers or managers to predict the

relative effectiveness of a leader if he or she were to move to a different type of team or team situation. In fact, such a system could provide a basis for selecting team leaders, training effective team leadership, and evaluating the effectiveness of team leadership. Finally, a classification system of team leadership could eventually aid in the development of leadership-oriented prescriptions for designing, managing, and training effective teams. Conversely, without a classification system of this sort, it seems unlikely that substantial progress can be made in the construction of leadership development programs and the generation of more effective models for understanding team leader performance (Fleishman et al., 1991). Before describing the steps that were taken to develop a classification system of team leadership, however, it is necessary to address the basic issues of taxonomy and classification.

Taxonomy: The Science of Classification

Because many researchers have been lax with respect to terminology in the field of classification, much confusion and inconsistency has developed. In order to avoid such problems in this research, the key taxonomic terms are defined. First, classification is defined as the ordering or arrangement of entities into groups or sets on the basis of their observed or inferred relationships (Dunn & Everitt, 1982; Fleishman & Quaintance, 1984; Sneath & Sokal, 1973; Sokal & Sneath, 1963). In turn, the end result of the

classification process--the set of categories or "taxa"--is referred to as a classification system (Dunn & Everitt, 1982; Fleishman & Quaintance, 1984; Sneath & Sokal, 1973; Sokal & Sneath, 1963). Although the term taxonomy has also been used to refer to the end result of classification, its broader meaning is used here. In particular, taxonomy is defined as the science of how to classify and identify; or more precisely, the theoretical study of systematic classifications including their bases, principles, procedures, and rules (Clifford & Stephenson, 1975; Dunn & Everitt, 1982; Fleishman & Quaintance, 1984; Simpson, 1961; Sneath & Sokal, 1973; Sokal & Sneath, 1963). On the other hand, numerical taxonomy is more narrowly defined as the grouping, by statistical or other mathematical methods, of entities into taxa on the basis of their attribute states (Sneath & Sokal, 1973; Sokal & Sneath, 1963). Finally, a taxon is defined as a distinct group or category in a classification system (Dunn & Everitt, 1982; Fleishman & Quaintance, 1984; Sneath & Sokal, 1973; Sokal & Sneath, 1963).

According to Fleishman and Quaintance (1984), the primary purpose of scientific classification is to describe the structure and relationship among similar objects or entities in terms that afford general statements about classes of objects. As such, the development of a classification system is considered by many researchers to be the requisite first step in any well-designed research

program (Fleishman & Quaintance, 1984; Freeberg & Rock, 1987; Golden & Thorndyke, 1980). Likewise, Dunn and Everitt (1982) stated that classification is an activity essential to all scientific work, and lack of knowledge regarding the properties and groupings of entities may have serious consequences for progress.

Benefits of Classification Systems

General scientific benefits. The construction of particularly effective classification systems has provided a basis for many fundamental scientific advances (Dunn & Everitt, 1982; Fleishman et al., 1991; Sneath & Sokal, 1973; Sokal & Sneath, 1963). Perhaps the most notable advances have come in the biological sciences where taxonomic research has provided the basis for classifying living organisms. However, the scientific and theoretical benefits provided by taxonomic research are not limited to any one field of study. In fact, it is possible to enumerate several, general scientific and theoretical benefits of taxonomic research (Dunn & Everitt, 1982; Fleishman et al., 1991; Fleishman & Quaintance, 1984; Fleishman & Zaccaro, 1992; Freeberg & Rock, 1987; Meyer, Tsui, & Hinings, 1993; Sneath & Sokal, 1973; Sokal, 1974).

First, classification systems facilitate the development of a standard language to describe concepts in the field, which, in turn, facilitates organization, understanding, and communication. More precisely, classification systems help to specify the phenomenon of

interest and induce some parsimony into the field by eliminating redundant terms and specifying the phenomenon's crucial structural components or properties. As Tiryakian put it, taxonomic classification creates order out of the potential chaos of discrete, discontinuous, or heterogeneous observations (cited in Meyer et al., 1993). This can be an especially significant benefit in complex fields or when investigating complex phenomena such as leadership or teams.

Second, classification systems specify the range of permissible generalization so that research results may be generalized and applied across equivalent classes and settings. This not only facilitates comparisons of findings across investigations, but also aids in generalizing and applying previous findings to new situations. For example, it would be extremely valuable to know the types of team leadership to which a certain leadership training program may be applied.

Third, classification systems increase research utility by providing a framework for hypothesis generation and assisting in theory development. In addition, classification systems facilitate the choice of operational research variables for study. In fact, well-developed systems permit researchers to seek and predict relationships between phenomena that do not seem to be connected in any obvious way. According to Tiryakian, this is because a good classification system is not a collection of undifferentiated entities but consists of clusters of

related entities (cited in Meyer et al., 1993).

Finally, classification systems can expose knowledge gaps or aspects of the phenomenon that are poorly understood. Consequently, they help to identify directions for future research. In fact, as understanding of the phenomenon improves, classification systems can bridge the gap between research and application.

Specific applied benefits. Classification systems provide a number of practical or applied benefits beyond their general scientific value. For example, a well-developed classification system of team leadership could provide a basis for job analysis, aid in the development of leader selection criteria and training specifications, and provide a basis for performance measurement and enhancement. As suggested above, the development of a classification system may provide the basis for an improved understanding of team leadership and continued progress in the study of team leadership.

Lessons from Previous Leadership Classification Efforts

Although no known attempts have been made to empirically develop a classification system of team leadership, several attempts have been made at classifying attributes of organizational (i.e., managerial or supervisory) leadership. In turn, these efforts may provide important lessons or guidelines about how to develop a classification system of team leadership. On the other hand, given the weaknesses of most previous classification

efforts, it is perhaps more accurate to suggest that most of these efforts provide lessons on what not to do in developing a useful and valid classification system.

For example, Fleishman et al. (1991) thoroughly reviewed the literature related to the classification of organizational leadership behavior, and found 65 different classification systems. However, only two general trends or commonalities were found among the various systems. First, nearly every system consisted of dimensions that focused on, or were related to, the common leadership dimensions of consideration and initiating structure. Yet, research has indicated that the predictive power of these two dimensions is only moderate, suggesting the parsimony they provide may be at the cost of limited descriptive accuracy (Fleishman et al., 1991). The second trend Fleishman et al. found was an increased sensitivity to the role that cognition plays in the leadership process. As such, recent classification efforts have placed emphasis on both cognitive and behavioral factors.

Despite these two general trends, there was far more diversity among the classification systems and their proposed dimensions than similarity. Fleishman et al. (1991) suggested three primary reasons for the diversity: (a) differences in theoretical frameworks, (b) methodological differences in classification procedures (e.g., differences in analytic techniques, measurement procedures, sample characteristics, levels of analysis,

organizational settings), and (c) differences in purpose or intended application. Essentially, these differences represent a failure to attend to the basic principles of taxonomic science (Fleishman et al., 1991). Consequently, no general, consensual classification of organizational leadership behavior has yet been developed. The lack of such a system makes it difficult to formulate principles for leadership identification and development, and ensures that theoretical progress will become a halting, haphazard affair (Fleishman et al., 1991).

Thus, the lesson to be learned from previous leadership classification efforts seems to be the importance of adhering to the principles and guidelines of taxonomic science when developing any classification system.

Developing a Classification System

A classification system must be systematically developed according to the rules of taxonomy if it is to be useful. In other words, certain priorities must be followed when beginning any classification effort (Clifford & Stephenson, 1975; Dunn & Everitt, 1982; Fleishman & Quaintance, 1984). More precisely, system development must progress through three basic phases--planning, classification, and evaluation.

In the planning phase, the researcher must first state the purpose of the classification effort. Once the purpose is established, the domain to be classified must be specified and the subject matter must be operationally

defined. Next, the taxonomist must select the attributes of the phenomenon that will be used to make classification decisions and select a classification approach.

In the classification phase, the grouping or clustering method that will be used to determine inclusion or exclusion of an entity from a taxon must be specified. Once these procedures are determined, the actual process of classification takes place. Typically, this involves systematic data collection and subsequent clustering of the data set by means of the grouping or clustering method.

The final phase involves evaluating the system's validity. This evaluation phase is crucial for determining the adequacy and utility of the classification effort. Each phase is explained in greater detail below, especially as it relates to the current classification effort.

Planning Phase

Step 1: Identify the Purpose

The purpose of a classification system may range from very specific to very general. Creating a classification system with a very specific purpose may serve to maximize specific utility but at the expense of generalizability of the system to other problem areas (Fleishman & Quaintance, 1984). In fact, when a specific application dictates classification, a unique system will be required to meet each specific purpose. On the other hand, creating a classification system with a very general purpose of organizing a wide range of data allows for greater

generalizability (Fleishman & Quaintance, 1984). Furthermore, a general system provides a conceptual framework whose elements may eventually be utilized in the prediction and interpretation of specific phenomena. In other words, individuals can still seek specific applications for general classification systems, but the specific applications do not dictate the composition or structure of the system (Fleishman & Quaintance, 1984). In fact, a general classification system is able to serve a variety of users by aiding in the interpretation, prediction, and control of a broader range of variables and phenomena. Finally, it seems that general classification efforts may help to satisfy what Meyer et al. (1993) identified as a critical need to move from reductionistic analysis of complex phenomena to holistic synthesis.

It also should be noted that purpose impacts and directs all subsequent steps in the classification process. For example, the approach used to group entities will differ depending on the purpose. The development of a classification system with a specific objective typically involves the grouping of entities based on the effects of a select set of variables on measures of the phenomenon (Fleishman & Quaintance, 1984). Grouping team leadership according to the effects of various training approaches on leadership effectiveness would be an example of developing a classification system with a specific purpose. On the other hand, the approach to developing a general classification

system is altogether different. Interest, at least initially, does not lie in the similarity of effects upon the phenomenon, but rather in the similarity of characteristics (intrinsic properties) of the phenomenon (Clifford & Stephenson, 1975; Fleishman & Quaintance, 1984).

Purpose of the current classification effort. Given the distinctions between specific and general purposes of classification, it was the goal of this research to develop a general classification system of team leadership. Thus, team leadership was classified or grouped on the basis of the similarity of a wide variety of relevant team leadership attributes. Despite its general purpose of organizing the data on team leadership and identifying types of team leadership, the system may be used for a number of more specific applications. For example, the system could aid in team design by determining the leadership needs of various teams. Likewise, the system could be used to determine how best to train team leadership skills in a particular team.

Step 2: Define the Domain

The next requisite step is an explicit definition of the targeted domain. Defining the domain of the classification system involves choosing the appropriate subject matter and identifying ways it can be clearly and systematically described (Dunn & Everitt, 1982; Fleishman & Quaintance, 1984). Essentially, this is an issue of operationally defining the subject matter.

In the present study, the subject matter or domain of interest was team leadership. In order to develop an operational definition of team leadership, each of its component parts was first defined. That is, definitions were provided for team and leadership in order to arrive at an appropriate operational definition of team leadership.

Defining "team." For the purposes of this research, team was defined as a distinguishable set of two or more individuals who must interact interdependently and adaptively in order to achieve or obtain certain specified, shared, and valued objectives (Salas, 1993). This definition of team was used for a number of reasons. First, Salas derived the definition by means of a thorough review of the team and small group literature and extensive involvement in empirical research related to teams and teamwork. Second, interdependency is a key component of the definition and it helps to distinguish teams from groups and other collectives in which members interact but are not required to coordinate their activities to reach their goal (Salas, 1993). Finally, while distinguishing teams from groups, the definition was not so narrow or restrictive as to eliminate various types of teams from consideration. For example, variables such as degree of role specification, degree of role specialization, organization or structure of the team, and the team's time span may be used to differentiate different types of teams or different levels of "teamness." However, because these variables were not

used to define team and were instead free to vary, the definition was capable of defining a variety of team types which, in turn, provided the basis for the identification of various types of team leadership.

Before leaving the issue of team definition, the size component of the definition must be addressed further. While the above definition includes dyads or two-person teams, there is some concern that dyads may be "fundamentally different from other small collectives" (Ilgen et al., 1993, p. 249). This is of special concern given that the focus of the present research is on leadership. As Ilgen et al. (1993) stated, "the nature of leadership is also more obscure when team size is limited to two persons" (p. 249). As a result, Ilgen et al. excluded dyads from their definition of team, considering only teams of three or more members.

Despite these concerns, dyads were not excluded from the definition of team used in the present research for one key reason. That is, given that the purpose of the present research was to identify various types of team leadership, it would be inappropriate to exclude teams that, by their nature, may require or involve a different type of leadership (i.e., leadership in dyads).

Defining "leadership." Given the extensive research conducted on leadership over the past several decades, one might expect a definition of leadership to be readily available. However, the dimensions and definition of

leadership remain unclear, creating ambiguity as to what leadership is all about (Pfeffer, 1977; Muchinsky, 1993). In fact, "there are almost as many definitions of leadership as there are persons who have attempted to define the concept" (Stogdill, 1974, p. 7). In addition, the numerous definitions that have been proposed appear to have little in common (Yukl, 1981). "The great variety of them suggests that there is little agreement as to the meaning of the concept and that little exists in the way of unifying theory" (Stogdill, 1974, p. 16). Likewise, Meyer et al. (1993) stated that most existing leadership theories represent a reductionistic stance focusing on a limited set of variables. As a result, existing theories are unable to synthesize the complex phenomenon of leadership. Finally, Mumford (1986) noted the lack of a well-founded theoretical conception of leadership that would provide a general, cross-situational approach to leadership identification and development.

According to Yukl (1981), "researchers usually define leadership according to their individual perspective and the aspect of the phenomenon of most interest to them" (p. 2). In turn, "differences between researchers in their conceptualization of leadership lead to differences in the choice of phenomena to investigate and to differences in interpretation of the data obtained" (Yukl, 1981, p. 3). This is not necessarily problematic or indicative of a lack of progress, however. Rather, it supports the notion that

leadership is a complex, multifaceted phenomenon characterized by varying topics of investigation. In fact, the diversity of interest and investigation may help to expand our understanding of such a complex phenomenon (Muchinsky, 1993). Yukl (1981) even asserted that "it is neither feasible nor desirable at this point in the development of the discipline to resolve the controversy over the appropriate definition of leadership" (p. 5). Instead, he declared that it is better to use the various conceptions of leadership as a source of different perspectives on a complex, multifaceted phenomenon. Similarly, Meyer et al. (1993) suggested that leadership be treated as a multidimensional phenomenon and analyzed as a configurational problem. For example, Meyer et al. suggested investigating the question of how different configurations of leadership traits, behaviors, and influence styles might be associated with leadership effectiveness. This could be achieved through the development of a multivariate classification system.

Given the state of affairs regarding leadership definitions, a specific, agreed-upon definition of leadership could not be provided for the present study. Instead, leadership was broadly defined as the process of organizing, maintaining, and directing the performance of others. To further clarify how leadership was conceptualized in this study, several definitional parameters are explained below.

First, it was important for the current research effort to avoid defining leadership only in terms of the characteristics, behaviors, or traits of a leader. Instead, it seemed necessary to consider the phenomenon as a process that may or may not be directed by an identifiable leader. For example, the leadership process may come entirely from the team itself, as is the case with self-governing teams; or leadership may come primarily from the team with some assistance by a leader, as is the case with self-managed teams (Hackman, 1986). Likewise, the leadership guidelines presented by Swezey and Salas (1992) suggest that the team members may have to take over the leadership process if the designated team leader is unable to lead.

In addition, Kerr and Jermier's (1978) notion of substitutes for leadership suggests that leadership is a process that can originate from the team task, the team members, and the organization--devoid of any identifiable leader. In particular, the team task and organizational mission can provide the structure and direction needed for goal attainment, and the team members and organizational resources can provide the support and assistance needed.

Second, it was not considered essential that an existing leader be a formal leader with legitimate or positional power. Again, the process of leadership was of interest regardless of whether it was based on position power or not. Likewise, the leader did not have to be the highest ranking member of the team, just concerned about

accomplishing the team's objectives and meeting the needs of the members.

Third, leadership did not need to involve overt behavior on the part of a leader. The cognitive activities of leadership were also of interest in the current research.

Fourth, leadership did not need to come from a member of the team per se. For example, a team's leadership could come from a leader external to the team and not directly involved in the team's functioning (e.g., a basketball coach, director of an acting ensemble).

Finally, leadership was not tied to an individual leader. Leadership could come from more than one formal or informal leader either inside or outside the team.

Defining "team leadership." While numerous definitions have been provided for the phenomenon of leadership, few definitions of team leadership have been developed. Parker (1991) broadly defined team leadership as "any action that helps a team reach its goals" (p. 50). While not providing an explicit definition of team leadership, Ginnett (1988) suggested parameters by which the phenomenon should be conceptualized. In particular, Ginnett suggested that team leadership be defined in terms of functional behavior rather than traits or skills inherent in any one person. In addition, Ginnett suggested that these functions might be performed by any member of the team although they are primarily the responsibility of a designated team leader. Recently, Cannon-Bowers et al. (1994) provided a more

explicit definition of team leadership. They defined team leadership as "the ability to direct and coordinate the activities of other team members; to assess team performance; assign tasks; motivate team members; plan and organize; and establish a positive atmosphere" (p. 43). Unfortunately, defining team leadership only in terms of skills and abilities is too restrictive for the purpose of this study.

Given that the purpose of the classification system was to be the general classification of team leadership based on similar characteristics, it seemed appropriate to define the domain rather broadly to ensure that important attributes and descriptors were not disregarded in the preliminary stage. Therefore, team leadership was defined as the process by which a team is organized, maintained, and directed toward goal attainment. Although team leadership was defined as a process, it should be noted that other factors that may influence the process, such as leader traits and KSAOs, were not excluded from consideration.

Step 3: Specify Attributes

Once the domain is operationally defined, it is necessary to specify the attributes to be used in classifying entities. As before, the purpose of the classification effort can provide guidance at this step in the process. When the purpose is to develop a general classification system, the focus should be on the similarity of defining characteristics or attributes. Therefore, a set

of defining characteristics of team leadership (e.g., traits, behaviors, functions, KSAOs) was determined and used to classify different types of team leadership.

One approach to selecting attributes is simply to use every available attribute or select as many attributes as possible. According to Sokal and Sneath (1963), the ideal classification system is one in which the taxa have the greatest content of information, based upon the widest possible range of unit characteristics or attributes. Likewise, Meyer et al. (1993) indicated that systems incorporating multiple dimensions are likely to prove most useful in both theoretical and empirical applications.

Including every available attribute in a classification effort may have the advantage of ensuring the domain of interest is adequately covered. However, this approach is neither practical nor possible in actual classification efforts. As a result, every taxonomist is forced to make a subjective decision regarding which attributes to select for comparison (Dunn & Everitt, 1982). In particular, the taxonomist must select a set of relevant attributes that are likely to differentiate among entities of different classes or taxa.

The decision regarding which attributes to include requires the taxonomist to consider certain trade-offs. For example, the taxonomist must be sure to select enough attributes to adequately cover the domain of interest. However, consideration must also be given for how many

attributes can be reasonably managed in a classification effort. According to Meyer et al. (1993), as attributes are added to increase congruence with reality, classification systems necessarily grow more complex and unwieldy. Furthermore, the taxonomist must be careful to ensure that the attributes selected are truly relevant. Milligan and Cooper (1987) indicated that the inclusion of only a small number of irrelevant attributes can have a serious impact on cluster development. As a result, they recommended that the taxonomist be able to justify the inclusion of each attribute with respect to how it could or should discriminate among clusters.

The recent research on team leadership and the parameters used to define the domain of team leadership provided an indication of the appropriate attributes to consider in the present research. That is, the characteristics of team leadership identified in previous research in conjunction with the factors used to define team leadership, provided a basis for selecting the relevant attributes of interest. A list of the team leadership attributes selected for the current effort is presented in Table 2.

Table 2

Attributes of Team Leadership to be Assessed

GENERAL:	BEHAVIORS/TASKS:
Number of leaders	Planning team tasks/setting strategy
Number of teams led	Stating expectations
Leader age	Organizing
Leader race	Analyzing information or data
Leader gender	Synthesizing or integrating data
Leader tenure	
Leadership stability/leader turnover	Making presentations regarding team activities
Type of environment	Making decisions
Level of leadership	Facilitating decision making
Nature or source of leadership	Solving problems
Relationship/membership	Facilitating collaborative problem solving
KSAOs:	Evaluating member performance
	Evaluating team performance
Physical requirements	Obtaining needed resources
Educational requirements	Distributing needed resources
Psychological requirements	Coaching/advising
Cognitive requirements	
	Counseling
Interpersonal communication skills	Negotiating
	Instructing/training new members
Conflict management/resolution skills	Instructing/training existing members
Process management skills	Orienting new members
Project management skills	
Problem-solving skills	Conducting meetings
Decision-making skills	Attending meetings
	Consoling members
Leadership ability	Supporting efforts of all members; standing behind the team
Leadership experience	
Team experience	Providing positive feedback
Team leadership experience	
Task experience	Providing negative feedback
	Confronting and resolving poor performance
Knowledge/understanding of team performance concepts	
Knowledge/understanding of team task	Backing up members
	Monitoring performance
	Discussing relevant issues
TRAITS:	Generating consensus
	Listening
Leadership style	Following-up
Charisma	Coordinating team activities
Power	Motivating/inspiring members
Work style	
Perceptions of members	Clarifying role expectations
Approachability	Encouraging mutual support
Fairness/impartiality	Rewarding individual members
Intelligence	Rewarding team
Team commitment	Disciplining members
Recognition as leader	

Table 2 (continued)

BEHAVIORS/TASKS:

Scheduling team activities
Getting to know members as individuals
Delegating work/assigning duties
Engaging the team in organizational activities

Establishing/defining boundaries
Managing boundaries; buffering the team from outside influences
Managing diversity/heterogeneity
Modeling effective teamwork behaviors

Holding members responsible or accountable for outcomes
Taking personal responsibility for outcomes
Facilitating shared leadership; developing leadership in all members

Structuring/designing the team
Explaining actions and decisions
Creating/managing team climate
Creating change; removing barriers

Setting goals
Directing team performance
Encouraging open communication

Participating in team activities
Managing interpersonal conflict
Fostering team cohesion
Fostering team morale
Fostering team commitment
Emphasizing working towards a common goal

Building or inspiring faith, loyalty, and trust in the team
Challenging members to expand their skills and abilities
Encouraging creativity and innovation
Recognizing and encouraging unique potential and abilities of members

Keeping members informed of all relevant events and information
Anticipating and planning for crisis situations and preparing the team for such crises
Reducing ambiguity
Fostering autonomy

Representation
Initiating structure
Tolerance of freedom
Role assumption
Consideration
Integration

Step 4: Select a Classification Procedure

Once the attributes are selected and defined, a procedure needs to be selected for classifying entities into taxa. Numerical taxonomic approaches are generally considered superior to the traditional approaches of monothetic and polythetic classification (Dunn & Everitt, 1982; Fleishman & Quaintance, 1984; Sneath & Sokal, 1973; Sokal & Sneath, 1963). However, the appropriate approach for any given classification effort will depend on the

purpose of the classification system as well as the nature of the phenomenon and the attributes. Therefore, each of the general approaches to classification is described before addressing the approach taken in the current effort.

The most basic form of classification is known as monothetic classification. It involves judging the presence or absence of a select set of attributes in a particular entity (Fleishman & Quaintance, 1984; Sneath & Sokal, 1973; Sokal & Sneath, 1963). That is, the presence or absence of certain attributes serves as the basis for classification (e.g., butterflies with black spots on their wings vs. butterflies without black spots on their wings). In monothetic classification, the existence of certain attributes is considered both necessary and sufficient for membership in a given taxon (Fleishman & Quaintance, 1984; Sneath & Sokal, 1973; Sokal & Sneath, 1963). As a result, each taxon has a unique set of defining attributes. For example, self-management may be defined as leadership with attributes A and B, whereas directive team leadership is defined as leadership made up of attributes C, D, and E. In this case, finding attributes A and B present in a certain team situation indicates that the leadership can be categorized as self-management.

Polythetic classification involves examining the pattern of attributes possessed by each entity (Clifford & Stephenson, 1975; Fleishman & Quaintance, 1984; Sneath & Sokal, 1973; Sokal & Sneath, 1963). Entities that have the

greatest number of shared attributes are grouped together in the same taxon; however, no single attribute is essential to taxon membership (Clifford & Stephenson, 1975; Fleishman & Quaintance, 1984; Sneath & Sokal, 1973; Sokal & Sneath, 1963). That is, the presence or absence of any given attribute does not determine taxon membership, rather it is the overall pattern of attributes that is important.

Unfortunately, because both of these approaches express similarity in terms of the number of common attributes, classification decisions are highly contingent on both the number and nature of attributes considered (Fleishman & Quaintance, 1984). Furthermore, basing similarity on sheer number of common attributes "...implicitly disregards the possibility that attributes may be present in differing degrees, and these degrees of similarity may dramatically influence our conceptions of just what constitutes sufficient similarity between certain objects for inclusion in a single category" (Fleishman & Quaintance, 1984, p. 71).

In general, whenever there is the potential for disagreement about the presence or absence of an attribute, it becomes necessary to examine the degree to which the attribute is present. In other words, the taxonomist must go beyond the fundamental question of, "Is some attribute present or absent?" If the attribute is present, subsequent questions need to be asked, such as, "How much of the attribute is present in the entity?" and "What kind of relationships can be expressed?" However, the answers to

these questions can come only from quantitative, empirically-derived data. In turn, the development of a classification system with quantitative data requires a numerical taxonomic approach to classification.

Whereas monothetic and polythetic classification are rationally-based and require subjective judgments regarding similarity of entities, numerical classification is empirically-based and involves statistical determination of similarity (Dunn & Everitt, 1982; Fleishman & Quaintance, 1984; Sneath & Sokal, 1973; Sokal & Sneath, 1963). In particular, numerical classification involves the empirical determination of similarity through the use of scaling and clustering techniques (Clifford & Stephenson, 1975; Dunn & Everitt, 1982; Fleishman & Quaintance, 1984; Sneath & Sokal, 1973; Sokal & Sneath, 1963). As a result, numerical classification procedures increase the objectivity involved in grouping or clustering similar entities (Dunn & Everitt, 1982).

Given the purpose of the current research and the nature of the attributes, a numerical classification approach was taken to develop a classification system of team leadership. Quantitative data on the relevant attributes of team leadership were collected and the similarity among the entities was determined by means of scaling and clustering techniques in order to form groups or clusters of team leadership types.

Classification Phase

The primary steps in the classification phase of a numerical classification effort are the development or identification of: (a) reliable measures of the attributes, (b) indices for determining similarity, (c) methods for grouping or clustering on the basis of similarity, and (d) criteria or rules for determining the number of clusters present. Each step is addressed below as it relates to the current classification effort.

Attribute Measurement

In numerical classification efforts, each entity is described in terms of each and every attribute, thereby distinguishing among entities on the basis of degree. As a result, each attribute must be measured or rated with respect to its level of involvement in a particular case of team leadership. In the present study, data were gathered from subject matter experts (SMEs) in a wide variety of teams by means of several different data-collection measures. The measures consisted of items from existing measures of team and managerial leadership as well as customized items developed for this study.

While details regarding the content of the measures are addressed in the Materials sections, it is important to point out that certain general criteria were considered in the construction of all of the measures. First, consideration was given to developing items and questions that were general or generic enough to apply to multiple

leadership situations, thereby providing a common basis for comparisons. Second, an effort was made to ensure that the questions and scales were sensitive enough to detect variations in the attributes, thereby allowing differences in leadership types to be explicated. Finally, an effort was made to ensure that each item or attribute was quantifiable and measurable. This was accomplished by developing numerical coding schemes for nominal data and numerical rating scales for all other data.

Similarity Indices

A similarity index measures the relationship between two entities, given the values of a set or profile of attributes common to both (Everitt, 1974). The two most common similarity indices in the social sciences are correlation coefficients and distance measures (Aldenderfer & Blashfield, 1984; Blashfield & Aldenderfer, 1988). In general, the greater the absolute magnitude of a correlation coefficient, the more similar two attributes, entities, or clusters are considered to be. However, the greater the value of a distance measure, the more dissimilar two attributes, entities, or clusters are considered to be. The selection of a similarity index for a particular classification effort is by no means a clear-cut matter. Each of the similarity measures has advantages and disadvantages that must be considered when choosing which one to use.

The biggest disadvantage of using the correlation

coefficient as the similarity measure is its insensitivity to differences in magnitude and dispersion of the variables (Aldenderfer & Blashfield, 1984; Blashfield & Aldenderfer, 1988; Everitt, 1974). That is, correlation coefficients are sensitive only to the shape or pattern of variable scores, not the magnitude or standard deviation of the scores. Nonetheless, when compared to other measures of similarity, the correlation coefficient has been found to be effective. Correlation coefficients have been used successfully in a wide variety of research applications involving cluster analysis (Blashfield & Aldenderfer, 1988). In addition, Monte Carlo studies (i.e., studies using computer-generated data rather than real-world data) that have compared the effectiveness of various similarity indices consistently find that correlation leads to better clustering results than distance measures (Blashfield & Aldenderfer, 1988; Edelbrock, 1979; Scheibler & Schneider, 1985). Unfortunately, the reason for the superior performance of correlation as a similarity measure is unclear.

Distance measures have the advantage of being sensitive to the magnitude and dispersion of variable scores. However, this sensitivity can be a disadvantage as well. In particular, distance measures are strongly affected by variables with large size differences and large standard deviations (Aldenderfer & Blashfield, 1984; Blashfield & Aldenderfer, 1988). Fortunately, these problems can be minimized or eliminated by standardizing the data. However,

Blashfield and Aldenderfer (1988) noted that distance measures may be affected by such data transformations and cautioned against indiscriminate standardization.

Despite the potential superiority of correlations over distance measures, the taxonomist should not automatically use the correlation coefficient as the measure of similarity. The reason lies in the fact that not every classification or clustering technique performs best with the use of correlations. Thus, the selection of appropriate similarity index is inexorably linked to the selection of the classification or clustering technique. In fact, selection of a similarity index can be considered secondary in importance to selecting the best clustering technique for a particular study. Therefore, the taxonomist should select the best clustering technique regardless of the similarity measure typically associated with it. As a result, the focus turns to the selection of a clustering technique.

Cluster Analysis Techniques

Cluster analysis refers to a large class or family of multivariate statistical techniques used to create classifications by empirically forming or identifying relatively homogeneous groups or clusters of highly similar entities (Aldenderfer & Blashfield, 1984; Blashfield & Aldenderfer, 1988; Sokal & Sneath, 1963). According to Fleishman and Quaintance (1984), "cluster analytic techniques are particularly useful when there is no theoretical scheme or model to guide the analyst through a

large matrix of data representing indices of agreement in the properties or scores of the attributes examined" (p. 78). A major contribution of cluster analysis is its ability to reveal natural groupings or clusters of data points that are more like each other than data points outside the group. Furthermore, the groups or clusters are defined by the data themselves; they are not formed by the use of some external criterion of classification (Fleishman & Quaintance, 1984). As a result, a cluster analytic procedure was selected over other classification techniques (e.g., multidimensional scaling, latent structure analysis, discriminant function analysis, factor analysis) in the present effort to classify team leadership.

Although several different clustering techniques are available, each possessing certain strengths and weaknesses, it is best to consider the various classes or families of methods before selecting a particular technique. The classes or families of cluster analysis techniques are formed on the basis of the underlying methodology of the techniques. As such, the taxonomist can simplify his or her selection of a technique by first choosing the general methodology that will meet the needs of the classification effort and then selecting the best technique from among that family of procedures. While consideration was given to all of the classes of cluster analysis techniques in the present effort, it is beyond the scope of this paper to address every cluster analysis technique or every class of

clustering procedures. Rather, the general method and specific technique used in the present effort are discussed and the reasons for their use explicated.

Hierarchical agglomerative methods. In the present study, a method of hierarchical agglomerative cluster analysis was used. Hierarchical agglomerative methods are the most frequently used, best understood, and most researched methods of clustering (Aldenderfer & Blashfield, 1984; Blashfield, 1976; Blashfield & Aldenderfer, 1988). The hierarchical agglomerative methods begin by defining each entity or case in a data set as a cluster and proceed by combining these clusters on the basis of their similarity until all entities are grouped into one cluster (i.e., the entire data set). Hierarchical agglomerative methods require the calculation of a similarity matrix, which is searched to form the clusters. The outcome of these methods is a tree structure (i.e., dendrogram) that depicts the groupings derived at several iterations of analysis. By design, the hierarchical agglomerative methods produce nonoverlapping clusters such that each entity can be a member of only one cluster of the same level. However, each cluster can be subsumed as a member of a larger, more inclusive cluster at a higher level.

Ward's method of hierarchical agglomerative cluster analysis. The specific hierarchical agglomerative techniques differ primarily with respect to their linkage rules for forming clusters. Of the available techniques,

the minimum variance method, commonly referred to as Ward's method, was used in the present classification effort. Based on a series of Monte Carlo studies, it has been shown that Ward's method outperforms most other clustering methods in its accuracy and ability to find known structure in data (Blashfield, 1976; Blashfield & Aldenderfer, 1988; Kuiper & Fisher, 1975). In addition, Ward's method is able to develop the best hierarchy in the presence of uncertainty in the data (Fleishman & Quaintance, 1984).

Ward's method is not without its problems, however. For example, it is strongly biased toward producing clusters of relatively equal size (Blashfield & Aldenderfer, 1988). Furthermore, it is sensitive to outliers (Milligan, 1980) and profile elevation (Aldenderfer & Blashfield, 1984; Blashfield & Morey, 1980). Finally, Ward's method, like all hierarchical agglomerative methods, is unable to modify a poor early partition of the data set in subsequent steps of the clustering process (Blashfield & Aldenderfer, 1988). In other words, if an entity is poorly classified early in the clustering process, it cannot be reallocated to another cluster later in the process. Despite these limitations, Ward's method is generally regarded as one of the best overall methods of cluster analysis (Milligan & Cooper, 1987). As such, it was used in the present classification effort.

Ward's method analyzes the potential loss of information that results from the grouping of entities into

clusters (Everitt, 1974). The method is based on the premise that as the number of clusters is reduced (i.e., more entities of increasing dissimilarity are grouped together), there will be a corresponding loss of information (Ward & Hook, 1963). In turn, Ward's method attempts to minimize the loss of information that results from clustering by determining the average similarity to be gained by merging two entities, clusters, or an entity and a cluster. More specifically, the method tries to minimize the variance within clusters by assessing the error sum of squares (ESS). The formula for the ESS is presented and defined below.

$$ESS=\sum_{s=1}^{p}\sum_{g=1}^{k-1}\sum_{r=1}^{n_g}[(y_{rsg})^2]-\sum_{s=1}^{p}\sum_{g=1}^{k-1}[1/n_g(\sum_{r=1}^{n_g}y_{rsg})^2]$$

where:

r = entity [r = 1, . . ., n_g]

g = group [g = 1, . . ., k-1]

s = attribute [s = 1, . . ., p]

y_{rsg} = observation of the sth attribute for the rth entity in the gth group.

The ESS criterion is calculated for all possible mergings at each iteration. Clusters are formed that result in the minimum increase in the ESS (i.e., the minimum variance within clusters). The procedure is repeated until all entities have been merged into one group and the hierarchy is complete.

Ward's method uses squared Euclidean distance as its measure of similarity. Squared Euclidean distance, d^2, is computed by squaring the difference in scores on each profile attribute and summing over the profile of scores (Ward & Hook, 1963). Although, as stated above, distance measures are often considered inferior to correlations as a measure of similarity, Edelbrock (1979) and Scheibler and Schneider (1985) found that Ward's method provided results that were equally accurate or more accurate than hierarchical clustering algorithms utilizing Pearson correlation coefficients. Thus, it appears, at least for Ward's method, that clustering techniques utilizing distance measures need not be inferior to methods utilizing correlations. As such, squared Euclidean distance served as the similarity index in the present classification effort.

Determining the Number of Clusters Present

Although clustering techniques are effective for grouping entities into clusters, virtually all procedures fail to provide information as to the number of clusters or partitions present in the final solution (Everitt, 1979; Milligan & Cooper, 1985). In fact, hierarchical procedures such as Ward's method produce a series of cluster solutions that range from n clusters (where n is the number of entities in the data set) to a single cluster subsuming the entire data set (Milligan & Cooper, 1985). Thus, the question arises as to how to determine the best cluster solution or optimal number of clusters. According to

Aldenderfer and Blashfield (1984), two general approaches exist for making this determination--heuristic procedures and formal tests. At the most basic level, heuristic procedures involve a subjective inspection of the clusters displayed in the dendrogram to determine the appropriate structure. As Aldenderfer and Blashfield (1984) noted, such a procedure is easily biased by the needs and opinions of the researcher.

A more formal, yet still heuristic, approach is to examine the value of the clustering coefficient at each merger for a significant increase (Aldenderfer & Blashfield, 1984). With respect to Ward's method, this would involve examining the ESS value at each merger. In particular, a sharp increase in the ESS value would signify that much of the classification system's accuracy has been lost by reducing the number of clusters at that stage (Aldenderfer & Blashfield, 1984; Ward & Hook, 1963). As such, the number of clusters identified during the previous merger provides a good estimate of the actual number of profile clusters in existence (Ward & Hook, 1963).

Although clustering coefficients (e.g., ESS) may indeed provide useful information for determining the number of clusters present, there is still a great deal of subjectivity involved in their use. For example, what denotes a "sharp increase" in the ESS, and what if the increases in ESS are relatively equal? As a result, Mojena (1977) developed "stopping rule #1," which utilizes an

inequality to more objectively define what is meant by a sharp increase in the ESS. The optimal partitioning is selected that first satisfies the inequality (i.e., when the ESS first exceeds the critical value). Thus, the determination of how many clusters are present is based on the more objective inequality rather than the taxonomist's judgment.

While Mojena's stopping rule #1 is an improvement over more heuristic approaches, it is not without problems. Most notably is the determination of the appropriate critical value for the inequality. In a series of Monte Carlo studies, Milligan and Cooper (1985) found that the critical value needed for optimal recovery of the known structure varied with the number of clusters present. While adjustments could be made to the critical value in the Monte Carlo studies, the selection of the optimal critical value is impossible in applied settings because the true structure is not known.

The cubic clustering criterion represents an ideal alternative. First, with respect to overall ability to recover known structure in Monte Carlo data sets, the cubic clustering criterion outperformed Mojena's stopping rule #1 (Milligan & Cooper, 1985). Second, the cubic clustering criterion has the practical advantage of being the test statistic used in the SAS programming package. As a result, the cubic clustering criterion was used to determine the number of clusters present in the current classification

effort.

The cubic clustering criterion is the product of two terms: (a) the natural logarithm of $(1 - E(R^2))/(1 - R^2)$ where R^2 is the proportion of variance accounted for by the clusters and $E(R^2)$ is the expected proportion of variance, and (b) $((np/2)^{.5})/((.001 + E(R^2))^{1.2})$ where p is an estimate of the dimensionality of between cluster variation (Milligan & Cooper, 1985). Unlike other stopping rules, the constant terms in the cubic clustering criterion equations were developed through extensive simulation tests (Milligan & Cooper, 1985). The maximum value across hierarchy levels typically is used to determine the optimal number of clusters in the data (Milligan & Cooper, 1985; Sarle, 1983).

Evaluation Phase

One of the most critical stages in the development of a classification system involves evaluating or validating the end result. Evaluation is important in supporting the meaningfulness of the resulting categories or types. In fact, because nearly all cluster analysis techniques will generate a cluster solution in any data set, it is essential that adequate evidence of the solution's validity be provided (Blashfield, 1980; McIntyre & Blashfield, 1980). According to Blashfield (1980), evaluating the validity of a cluster solution allows the researcher to determine whether the cluster structure was forced by the clustering technique or discovered.

The most basic approach to evaluating a classification

system is to submit the data set to a number of different clustering techniques and compare the resulting partitions. If the cluster structure remains fairly consistent across the different clustering methods, it would seem reasonable to conclude that the structure is strong, stable, and not an artifact of any given method (Milligan & Cooper, 1987). As Blashfield and Aldenderfer (1988) stated, stable clusters are more likely to represent natural groupings than unstable clusters. Unfortunately, this approach to evaluation introduces a level of confounding in the results, especially if replication does not occur. In particular, it is impossible to determine if a failure to replicate is due to a lack of structure in the data or to differences in the types of structures that different clustering techniques impose on the data. In addition, a more fundamental problem lies in the use of a single data set. According to Milligan and Cooper (1987), even if a cluster structure is replicated across clustering methods, the use of a single sample makes it impossible to generalize the clustering results to other data sets.

A better approach is to evaluate the replicability of the cluster solution across a series of data sets rather than a series of clustering techniques. "If a cluster solution is repeatedly discovered across different samples from the same general population, it is plausible to conclude that this solution has some generality" (Aldenderfer & Blashfield, 1984, p. 65; McIntyre &

Blashfield, 1980, pp. 225-226). Alternately, if a cluster solution is not stable, it is unlikely to have general utility (Aldenderfer & Blashfield, 1984; McIntyre & Blashfield, 1980).

Unfortunately, this approach is little more than an effective check of the reliability or internal consistency of a cluster solution. According to Aldenderfer and Blashfield (1984), showing that the same clusters appear across different subsets when using the same clustering technique is not strong evidence for the validity of a solution. "In other words, the failure of a cluster solution to replicate is reason for rejecting the solution, but a successful replication does not guarantee the validity of the solution" (Aldenderfer & Blashfield, 1984, p. 65).

An effective alternative is the relatively sophisticated two-sample cross-validation process proposed by McIntyre and Blashfield (1980). According to Milligan and Cooper's (1987) review of cluster analysis research, the two-sample cross-validation process is an excellent strategy for establishing or estimating both the reliability and generalizability of a classification system. More precisely, the process is effective in determining the stability of a cluster solution and estimating the accuracy of a classification system (Milligan & Cooper, 1987). As such, it was the primary approach used to establish the validity of the cluster solution generated in the current classification effort.

Despite the overall effectiveness of the two-sample cross-validation process in establishing the validity of a cluster solution, other methods are necessary to establish external validity. For example, Aldenderfer and Blashfield (1984) and Morey, Blashfield, and Skinner (1983) suggested that the best way to validate a cluster solution is to perform significance tests that compare the clusters on variables or attributes not used to generate the cluster solution. The power of this approach to external validation is that it directly tests the generality of a cluster solution against relevant criteria. In the current study, this additional validation process was accomplished by utilizing the data from a subset of the measures (i.e., the most structured and quantitative) for clustering, and retaining the data from the remaining measures as dependent variables. Analysis of variance procedures were then used to evaluate the effects of cluster assignment on the various dependent variables. Significant results provide strong evidence for the external validity of the cluster solution.

Summary

To summarize, this study was designed to evaluate the characteristics or attributes of team leadership, identify different leadership types, and classify the various types into a general classification system capable of describing the characteristics of team leadership. It was decided that the system would be formulated by means of an empirical, cluster-analytic approach based on quantifiable data. In

turn, it was decided that the specific clustering technique to be utilized would be Ward's method of hierarchical agglomerative cluster analysis. The cubic clustering criterion was selected as the means of determining the number of clusters present. Finally, it was determined that the cluster solution would be validated by means of the two-sample cross-validation process proposed by McIntyre and Blashfield (1980), and additional evaluation of the external validity of the cluster solution would be evaluated by analysis of variance procedures.

While no previous attempts have been made to develop a classification system of team leadership according to taxonomic principles, there is some anecdotal support for the existence of distinct types of team leadership. For example, the diversity of characteristics that have been associated with effective team leadership and the contingencies that impact the appropriateness or importance of certain characteristics in certain situations, suggest that different types of team leadership exist and are needed for effective teamwork. Moreover, Schlesinger specifically noted that the kind of supervision called for in work teams varies from one team to another, thereby supporting the existence of distinct types of team leadership (cited in Lawler, 1991).

At its most basic level, this study has implications for how we view, think about, and understand team leadership. However, this study also has implications for

the evaluation of team leadership and the selection and training of team leaders. It also has implications for the design, training, and management of teams. Finally, and perhaps most importantly, it has implications for how team leadership is studied and what generalizations may be made. For example, knowing the types of team leadership that exist will allow researchers and managers to predict the relative effectiveness of leaders in one team as they move to another, or to identify the changes the leader must make to remain effective in a different team situation.

CHAPTER II

METHOD

Study 1

Participants

In Study 1, data were collected on a sample of 71 teams in order to test the data collection procedures and materials, and to evaluate the psychometric properties of the measures. Participants were undergraduate psychology students from Old Dominion University who were currently or recently associated with a team. Each team was represented by one individual. Although participants were not required to be the leader of their team, they were required to have a thorough knowledge of the leadership practices of the team. It should be noted that 77 individuals actually participated in Study 1; however, 6 were dropped due to incomplete data (i.e., they were unwilling or unable to complete all measures). Of the 71 participants, 40 were leaders and 31 were members but not leaders. Thirty-two different functional team "types" were represented in Study 1 and are presented in Table 3.

Materials

Teamness Index. A Teamness Index was created to evaluate the extent to which a particular "team" fit the operational definition of team used in this study (see Appendix A). The measure consisted of eight items that were each rated according to a 5-point scale ranging from "Strongly Disagree" (1) to "Strongly Agree" (5), with a

Table 3

Teams Represented in Study 1

Team	N
Golf	1
Crew	1
Rugby	2
Tennis	1
Soccer	7
Cycling	1
Lacrosse	1
Football	2
Baseball	1
Softball	2
Wrestling	4
Basketball	5
Volleyball	3
Ice Hockey	1
Field Hockey	1
Roller Hockey	1
Little League Football	2
T-ball or Little League Baseball	2
Flag Corps	3
Cheerleading or Pompon Squad	10
Debate	3
Forensics	1
Research Team	1
Student Activity Club/Organization	1
Dance troop or company	3
Prom Committee	1
Organizational Work Team	4
Military (Army) squad	1
ROTC	1
EMT/Ambulance Crew	1
Loss Prevention Team	1
Aerobics or Fitness Class	2
	71

midpoint of "Unsure" (3). The Teamness Index was not used to eliminate entities but rather distinguish between teams as operationally defined here and more broadly defined groups. Using the index to identify rather than eliminate

groups allows non-teams to be retained as potential "marker entities." Marker entities are those entities known or believed a priori to be different from other entities on a certain set of characteristics. As such, they serve as anchors and provide a basis for comparisons and hypothesis testing. For example, if it were hypothesized that group leadership is different from team leadership on some attribute or set of attributes, then identifying an entity as a group would allow for a comparison of group leadership (i.e., the marker entity) and team leadership and allow the hypothesis to be tested.

The following guidelines were used to distinguish among entities. First, an entity was considered a "team" if it received an average Teamness Index rating above 3.75. This value relates to general agreement that an entity fits the operational definition of a team (i.e., a rating of 4 indicates agreement and a rating of 5 indicates strong agreement). An entity was considered a "pseudo-team" if it received a mean rating between 3.00 and 3.75. The pseudo-team guidelines correspond with some agreement and some uncertainty regarding the extent to which an entity fits the definition of a team. Finally, an entity was considered a "group" if it received an average Teamness Index rating less than 3.00, or there were more than two ratings given below 3.00. These guidelines were associated with uncertainty or disagreement as to whether an entity fit the definition of a team.

According to these guidelines, the Study 1 sample consisted of 65 teams, five pseudo-teams, and one group. The pseudo-teams were the cycling team, one of the soccer teams, a wrestling team, a recreational volleyball team, and the aerobics class. Interestingly, the entity identified as a group was a basketball team. However, it was subsequently disclosed that the low ratings on the Teamness Index were due to the fact that the "team" had a superstar player who dominated the game as well as the attention of the coach, thereby reducing the interdependency, teamwork, and cohesion typically associated with basketball teams.

Six additional data collection instruments were constructed to assess the attributes of team leadership. The instruments included a structured interview, two paper-and-pencil instruments, and three card-sort tasks. Each measurement instrument is described below along with the steps involved in developing it.

Team Leadership Interview. A structured interview was constructed to assess several attributes of team leadership. More precisely, eight different versions of the interview were constructed, differing on the basis of: (a) whether the participant was currently associated with the team or was associated with the team in the past; (b) whether the team had a single leader or multiple leaders; and (c) whether the participant was a leader or a member. Thus, the eight versions were: (1) past/single-leader/leader, (2) present/single-leader/leader, (3) past/single-leader/member,

(4) present/single-leader/member, (5) past/multi-leader/leader, (6) present/multi-leader/leader, (7) past/multi-leader/member, and (8) present/multi-leader/member. In order to determine the appropriate version to be used in each session, a set of five preliminary questions was developed (see Appendix B).

It should be noted that two additional versions of the interview were created to address teams with no designated leader (i.e., a past/no-leader version and a present/no-leader version). However, all of the participants in Study 1 indicated that their team had at least one designated leader. Therefore, the no-leader versions were not used and are not addressed further.

Past and present versions of the interview differed only with respect to verb tense (e.g., "was the leadership..." vs. "is the leadership..."). Leader and member versions differed only with respect to subject (e.g., "how often do you..." vs. "how often does the leader..."). The single-leader and multi-leader versions differed with respect to the phrasing of questions. For example, a question in the present/single-leader/member version was worded, "Does the leader ask for input from members when faced with a problem?" and in the past/multi-leader/leader version it was worded, "Did you ask for input from members when faced with a problem?" and included a follow-up question, "How about the other leaders, did they ask for input from members when faced with a problem?" In addition,

the multi-leader versions contained two more questions than the single-leader versions. Specifically, the multi-leader versions asked how many leaders the team had, and whether or not the different leaders had an equal amount of power or influence over the team. The multi-leader versions contained 58 primary questions while the single-leader versions contained 56. However, it should be noted that in addition to the primary questions, each version contained a number of secondary or follow-up questions that were also coded. A copy of the present/multi-leader/leader version of the interview utilized in Study 1 is presented in Appendix C as an example.

Although the questions were written specifically for this research, their content was based on the attributes identified as relevant to effective team leadership in previous research (see Tables 1 and 2). Some questions were open-ended whereas others required only a "yes" or "no" response or choice of options. All questions in the interview were oriented toward the leadership practices in the participant's particular team.

Team Leadership Questionnaire. A Team Leadership Questionnaire (TLQ) was developed to assess aspects of team leadership that were better assessed in a paper-and-pencil format than in an interview. For example, questions that involved choosing one of several different options or rank ordering several options were presented in the questionnaire rather than the interview. Four versions of the TLQ were

created and varied by whether the SME was currently or previously affiliated with the team, and whether the SME was a leader or member of the team. Separate single-leader and multi-leader versions of the TLQ were not created or required due to the nature and orientation of the questions. All versions consisted of eight questions related to team leadership. In addition, the first page of the TLQ asked for general demographic information regarding the participant (e.g., name, age, race). The present/leader version of the Team Leadership Questionnaire is presented in Appendix D as an example.

Items 1, 5, 6, 7, and 8 were created by the researcher; however, the content of these items was based on previous research related to teams and team leadership (see Table 1). Items 2, 3, and 4 represented modified versions of the leadership questions included in the "Teamwork Appraisal Survey" developed by Hall (1988). Modifications included minor word changes aimed at simplifying items and requiring ranking (items 2 and 4) or rating on a 5-point scale (item 3) rather than the more complex rated-ranking procedure designed by Hall.

Leadership Behaviors and Tasks form. The Leadership Behaviors and Tasks (LBT) form was designed as a task analysis checksheet. The instrument consisted of 80 task statements representing a thorough list of tasks and behaviors performed by team leaders (see Table 2). Participants were asked to rate the extent to which each

task was part of the leadership activities of the team, and the importance of the task for successful leadership. Extent of involvement was rated according to a 4-point scale ranging from "not part of leadership" (0) to "major" (3). Similarly, importance was rated according to a 4-point scale ranging from "not important" (0) to "major" (3). For scoring purposes, however, the ratings for each task were summed to produce a single task score ranging from 0 to 6. The LBT form utilized in Study 1 is presented in Appendix E.

The remaining measures were designed as card-sort tasks. The measures were developed into card-sort tasks for a number of reasons. First, after having completed the 80-item LBT form, the card-sort activity provided a change that could help to reduce boredom and fatigue. Second, unlike a paper-and-pencil measure where ratings may be given without fully reading or comprehending an item, the card sort helps to ensure that the participant reads each item before rating it. Finally, the card sort allows the researcher to observe the participant and determine if he or she is reading the items and if the ratings coincide with responses given to related questions in the interview (i.e., to detect illogical or inconsistent responses).

KSAO Card Sort. The KSAO Card Sort consisted of 35 knowledge, skills, abilities, and other characteristics that were identified or considered by various researchers to be relevant to effective team leadership (see Tables 1 and 2). Each of the 35 items was printed on a separate 4 x 6 inch

index card. Participants were instructed to sort the cards by placing each card in the appropriate response category. In addition, they were asked to consider the probe question, "How important is this for effective leadership in this type of team?" The 5-point response scale ranged from "1 = Unimportant, not necessary for successful leadership" to "5 = Critical, essential for successful leadership." The probe question and each of the five responses was printed on a separate 4 x 6 inch index card. The probe question and the response cards were laid out in front of the participant before handing him or her the stack of KSAO cards. The KSAO Card Sort form used to record participant ratings in Study 1 is presented in Appendix F.

LBDQ for Team Leadership. The Leader Behavior Description Questionnaire Form XII (LBDQ) developed by Stogdill (1963), and the Leadership Opinion Questionnaire (LOQ) developed by Fleishman (1957) served as the primary sources for the items comprising the "LBDQ for Team Leadership" (LBDQ-TL). Specifically, items from 6 of the 12 subscales of the LBDQ were utilized. The six subscales included were representation, initiating structure, tolerance of freedom, role assumption, consideration, and integration. The selection of these six subscales and the exclusion of the other six was based on a number of factors. First, there was a very real need to limit the number of items in order to limit session length to a reasonable timeframe and minimize the effects of fatigue. Second,

according to Cook, Hepworth, Wall, and Warr (1981), the six subscales selected are among the most frequently utilized. Likewise, Cook et al. (1981) stated that "rarely has the complete instrument been used" (p. 228). Therefore, there was little reason to be concerned about utilizing only some of the subscales. Finally, many of the items contained in the other subscales were deemed less relevant to an investigation of team leadership practices. For example, many of the items in the unused subscales were concerned with the characteristics of a particular leader (e.g., questions about whether the leader is working his or her way to the top of the organization) rather than general leadership behaviors or activities.

A number of studies have investigated the measurement properties of the subscales and found generally positive measurement characteristics (Cook et al., 1981). For example, the technical manual for the LBDQ summarizes nine studies utilizing samples ranging from 44 to 235 participants ($\underline{M}$ = 105) that were conducted to assess the measurement properties of the scales. The results showed average Kuder-Richardson internal consistency reliabilities for the 12 LBDQ subscales ranging from .68 to .81 (Stogdill, 1963). The average reliabilities and ranges reported for the six subscales incorporated into the present research were as follows: representation, .70 (.54 to .85); initiating structure, .76 (.70 to .80); tolerance of freedom, .76 (.58 to .86); role assumption, .77 (.57 to

.86); consideration, .81 (.76 to .87); and integration, .76 (.73 to .79). Unfortunately, "no analyses of the relationships among the scales, nor multivariate analyses to explore scale independence, are described in the [technical manual]" (Cook et al., 1981, p. 228).

The representation and integration subscales each consist of five items. Each of the other subscales consists of 10 items. All items were retained in the creation of the LBDQ-TL, except for one item from the role assumption subscale. Specifically, the item, "is easily recognized as the leader of the group," was not included because it was much more oriented toward follower-perceptions than leader behaviors. Furthermore, leader recognition was addressed in the interview.

Items were slightly modified to address team leadership and to fit the nature of the probe question--"To what extent do leaders of this type of team do this activity?" For example, the original item, "sees to it that the work of the group is coordinated," was reworded as, "see to it that the work of the team is coordinated."

Select items from the LOQ, which measures only consideration and initiating structure, were also modified and added to the consideration and initiating structure subscales of the LBDQ-TL. Most of the items on the 40-item LOQ were largely redundant with those of the LBDQ. Therefore, only three items from the LOQ's initiating structure scale and three items from the consideration scale

were selected. These items were modified as described previously.

Two additional items were included in the LBDQ-TL that were identified in previous research as relevant to team leadership. Specifically, one item was added to the initiating structure subscale (i.e., develop and set strategies for the team to follow), and one item was added to the tolerance of freedom subscale (i.e., provide the members with autonomy). See Table 1 for references to these items.

Finally, a 12-item transformational leadership subscale was created and included in the LBDQ-TL. Items representing behaviors associated with transformational leadership were generated from a review of the literature discussing a connection between transformational leadership and effective team leadership (see Table 1). Items were created to address the three key attributes of transformational leadership. In particular, four items were created to address charismatic leadership behaviors, three items were created to address intellectual stimulation of members, and five items were generated to address individualized consideration of members.

The complete LBDQ-TL measure consisted of 69 items and seven subscales as follows: representation--5 items; initiating structure--14 items; tolerance of freedom--11 items; role assumption--9 items; integration--5 items; consideration--13 items; and transformational leadership--12

items. Each of the 69 items was printed on a separate 4 x 6 inch index card. Participants were instructed to sort the cards by placing each card in the appropriate response category. The 5-point response scale ranged from "Never" (1) to "Always" (5) with a midpoint of "Occasionally" (3). However, some of the items are negatively worded, and therefore, were reverse scored. The probe question and each of the 5 responses was printed on a separate 4 x 6 inch index card. The probe question and the response cards were laid out in front of the participant before handing him or her the stack of leader activity cards. The LBDQ-TL form used to record participant ratings in Study 1 is presented in Appendix G.

It should be noted that items are summed within each subscale to produce subscale scores. Therefore, the LBDQ-TL produces only seven scores, one for each subscale.

Leader Involvement Card Sort. The Leader Involvement (LI) Card Sort was designed to determine the extent to which leaders and members are involved in or responsible for various activities (e.g., training, goal setting, decision making, quality assurance). More precisely, it was designed to determine how leadership responsibilities were distributed among the team leader(s), members, and outsiders. The questions were written by the researcher and were designed to assess attributes that were considered or identified as relevant to effective team leadership in previous research (see Tables 1 and 2).

The measure consisted of 36 questions, each one printed on a separate 4 x 6 inch index card. Participants were instructed to sort the cards by placing each card in the appropriate response category. The 5-point response scale ranged from "Not at all; never" (1) to "Completely; entirely; always" (5). Each of the 5 responses was printed on a separate 4 x 6 inch index card. The LI Card Sort form used to record participant responses in Study 1 is presented in Appendix H.

Procedures

Data were collected in individual sessions consisting of the participant and researcher. Participants were first asked to complete a standard informed consent form. Next, they were asked the five preliminary questions used to identify the team that would be discussed and the appropriate version of the materials to use. All participants were given the interview and measures in the same order. Specifically, they completed the Teamness Index, Team Leadership Interview, Team Leadership Questionnaire, LBT form, KSAO Card Sort, LBDQ-TL Card Sort, and the LI Card Sort. For each of the card-sort tasks, the researcher read the instructions, laid out the response cards, handed the participant the stack of cards, and recorded the participant's responses on the card-sort form. After completing the last card-sort task, the participants were thanked for their participation, asked if they had any questions, and given class credit for their participation.

Each session lasted approximately 1.5 hours.

It should be noted that the procedures and materials used in both Study 1 and Study 2 were reviewed and approved by the Old Dominion University, Department of Psychology Human Subjects Committee before any data were collected.

CHAPTER III

RESULTS

Study 1

This chapter addresses the results of Study 1. In particular, it describes how the measurement properties of the various instruments were evaluated and the findings from the evaluations. It should be noted that the types and rigor of analyses that were performed varied with the measures. For example, the LBDQ-TL was evaluated by, among other things, a LISREL VII confirmatory factor analysis because it consisted of established subscales, and each subscale consisted of items believed to assess the leadership dimension defined by the subscale (e.g., initiating structure, consideration). On the other hand, the Team Leadership Interview and Team Leadership Questionnaire were evaluated only on the basis of participant comments and descriptive statistics (e.g., means, standard deviations, frequencies) due to their unknown factor structure and the extent to which they were altered from their use in Study 1. The analyses performed, the measures included in the analyses, and the findings from the analyses are described in the following sections.

Initial Content Revisions

Every attempt was made to ensure the content validity of the measures during initial development by basing questions and scale items on previous research that found or suggested the attributes to be important for effective team

leadership. However, the content of each measure was carefully reviewed and re-evaluated at the completion of Study 1 considering insights and information gained through the data collection process.

In particular, six factors were considered in determining if and how the content of a measure should be revised. First, items or instructions that lacked clarity were removed or rewritten. In many cases, these items were identified on the basis of notes taken by the researcher during the data-collection sessions that indicated which items were misunderstood by the participants or about which they had questions or asked for clarification. In other cases, a careful review of the items led to further simplification or clarification to avoid potential misunderstanding. The determination of whether an item should be rewritten, removed, or moved to another measure was based on the other factors considered.

Second, efforts were taken to reduce redundancy. Some redundancy was considered acceptable because it ensured proper coverage of an attribute and helped to determine consistency and reliability of responses. However, items that were nearly identical were targeted for revision or removal.

Third, items that strayed from the domain of team leadership were removed. This amounted to a reevaluation of the content validity of the measures by ensuring that items were covering only those attributes identified as relevant

to the study (see Table 2). For example, some items in the interview focused more on characteristics of the team rather than team leadership.

Fourth, items that could be better assessed by a different scale or in a different measure were revised or moved to another measure. In some cases, this was a decision based on the responses of the participants. For example, if participants provided responses that were not initially considered among the response options, revisions were made. In other cases, the decision was based on the judgment of the researcher as to how an attribute could best be assessed.

Fifth, descriptive statistics were calculated and reviewed, and items with restricted variance or very low frequency were targeted for revision or removal. It should be noted, however, that the decision to remove an item due to limited variance was made very carefully. While it is true that an attribute that does not vary among entities will be useless for subsequent analyses (e.g., clustering), it is also true that the broader sample of teams utilized in Study 2 could show variability on items that showed limited variance in Study 1. Furthermore, certain items have informational value beyond potential classification value. For example, even if every member in the sample responded the same way to an item, thereby making it useless for clustering (i.e., due to zero variance), it may provide a wealth of information about the nature of team leadership

(e.g., every team leader provides both individual and team-oriented rewards).

Sixth, efforts were taken to help ensure that responses could generalize to similar teams (e.g., other high-school varsity baseball teams, other ambulance crews). In particular, items that could be strongly influenced by individual differences among particular leaders were either removed or moved to a measure that asked participants to consider teams of that type rather than their particular team. For example, an item asking whether the team leader discussed potential problems with team members was removed from the interview because responses could vary as a result of the openness of that particular team's leader. Again, the goal was to determine the nature of leadership in various teams and not the unique characteristics of a particular team's leader.

In some cases, consideration of these factors led to substantial revisions; in other cases only a few minor changes, if any, were made to the measure. The initial content changes that were made are described below for each measure.

Teamness Index. There was nothing resulting from its use in Study 1 that suggested the Teamness Index should be revised. As such, the Teamness Index was not altered as a result of the content review process.

Team Leadership Interview. The content review of the Team Leadership Interview resulted in the elimination of 21

questions, thereby reducing the multi-leader versions from 58 questions to 37, and the single-leader versions from 56 questions to 35. While 21 items were removed, however, only 15 were actually discarded. Five of the items were incorporated into the Team Leadership Questionnaire (i.e., the items dealing with leadership style, leader recognition, leadership in the team's life cycle, leadership in the team's activity cycle, and decision making practices). Likewise, one of the items was incorporated into the KSAO Card Sort (i.e., the item dealing with abstract reasoning).

In addition to removing items, several of the remaining questions were modified, reordered, or given different response options. Also, one new item aimed at determining the difference between leading teams and groups was added. In general, the interview was changed so substantially from its original form that it represented an essentially new measure. As a result, subsequent evaluations (e.g., factor analyses) of the Team Leadership Interview were considered pointless. In other words, any further analysis of the original interview would have been irrelevant for understanding the measure actually used in Study 2.

Team Leadership Questionnaire. The Team Leadership Questionnaire was also substantially altered from its original form. As stated previously, five items from the interview were modified and developed into five new questions on the questionnaire. In addition, seven questions were removed from the LI Card Sort and

incorporated into a rating task on the questionnaire. On the other hand, three questions originally included in the questionnaire were eliminated. In particular, the three items based on Hall's (1988) Teamwork Appraisal Survey were removed due to complexity of the items, lack of clarity, and consistent misinterpretation of the item instructions (i.e., participants did not know how to rank order items). Thus, the revised Team Leadership Questionnaire consisted of 12 questions or rating tasks.

In addition to adding several new items and removing some of the original items, many of the items that were retained were modified to improve clarity and ensure proper interpretation. As a result, the revised questionnaire represented an essentially new measure. Thus, as with the interview, subsequent evaluation of the original Team Leadership Questionnaire was considered meaningless.

Leadership Behaviors and Tasks form. Several items from the LBT form were reworded or modified to improve clarity and ensure proper interpretation and understanding. In addition, four clearer, more precise items were written to take the place of two of the original items. However, three highly redundant items were also combined into a single item. Therefore, the revised LBT form still consisted of 80 items. Of course, it was the original version of the measure that was evaluated in the additional Study 1 analyses.

KSAO Card Sort. Minor revisions were made to the KSAO Card Sort on the basis of the content review. The instructions were revised slightly to emphasize that participants should consider all teams of a given type rather than their particular team. In addition, six items were modified to improve clarity and ensure proper interpretation. Finally, one item was added to the measure. More precisely, the item addressing abstract reasoning was moved from the interview to the KSAO Card Sort because it was more appropriately assessed by the KSAO scale. Although the revised KSAO Card Sort consisted of 36 rather than 35 items, all subsequent analyses for Study 1 involved the original 35-item KSAO measure for which data existed.

LBDQ for Team Leadership. Only three minor modifications were made to the LBDQ-TL as a result of the content review. As with the KSAO measure, the instructions were revised to emphasize the need to consider teams of a particular type rather than a particular team. In addition, two items were modified slightly to improve clarity and ensure proper interpretation.

Leader Involvement Card Sort. Many of the changes to the LI Card Sort coincided with changes to the Team Leadership Questionnaire. That is, several items were moved from the LI Card Sort and developed into a rating task on the Team Leadership Questionnaire. In particular, the seven items on the LI Card Sort that dealt with potential sources of leadership were removed and developed into a source-of-

leadership rating task on the TLQ.

The LI Card Sort instructions were revised to emphasize the need to consider teams of a given type rather than a particular team. In addition, six items were slightly modified to enhance clarity and ensure proper interpretation. Finally, three items were eliminated from the LI Card Sort. The question that dealt with the design of the team was removed because it lacked direct relevance to team leadership. The question concerned with providing quality and customer service training was discarded due to lack of clarity and consistent misinterpretation by participants. The question regarding responsibility for obtaining resources was eliminated because it was nearly identical to an item included on the LBT form.

Thus, the LI Card Sort was reduced from 36 to 26 items as a result of the content review. In turn, to get the best indication of the measurement properties of the instrument as it would be used in Study 2, the revised 26-item version of the LI Card Sort was evaluated in subsequent Study 1 analyses.

LISREL Confirmatory Factor Analyses

LISREL confirmatory factor analysis allows a researcher to specify and test a model assumed to describe, explain, or account for the empirical data with relatively few parameters. According to Jöreskog and Sörbom (1989), "the model is based on a priori information about the data structure in the form of a specified theory or hypothesis, a

given classificatory design for items or subtests according to objective features of content and format, known experimental conditions, or knowledge from previous studies based on extensive data" (p. 96). In addition to evaluating the soundness of the model, however, LISREL confirmatory factor analysis can be extremely effective in assessing the measurement properties of the scale (Berndt, 1994). For example, the LISREL analysis provides an indication of individual item reliabilities (i.e., R^2 value for each item), the internal consistency reliability of the overall scale, and an indication of how well the items fit or measure the construct assumed to be assessed by the scale. In turn, LISREL effectively identifies where changes need to be made to improve the scale's measurement characteristics. For example, the results can indicate which items, if any, should be dropped to improve the reliability of the scale. "It must be emphasized, however, that one must have at least a tentative theory or hypothesis to start with" (Jöreskog & Sörbom, 1989, p. 96).

Unfortunately, because most of the measures were created solely for the purposes of this research, there was little or no basis on which to make a priori hypotheses regarding the measurement properties or underlying structures of most measures. However, there were two exceptions. The two exceptions were the LBDQ-TL and the Teamness Index.

Because the underlying structure of the LBDQ-TL was

largely based on the subscales of existing leadership measures (i.e., the LBDQ and LOQ), it was possible to develop and test models related to the structure and measurement properties of each subscale. Likewise, because the Teamness Index was designed to assess the single construct of "teamness," tests of this assumption could be conducted. In particular, LISREL VII (Jöreskog & Sörbom, 1989) was utilized to perform maximum likelihood confirmatory factor analyses on the items comprising the Teamness Index and each of the LBDQ-TL's subscales.

The results of the analyses provided factor loadings, measurement error estimates, and squared multiple correlations for each item. These item statistics were particularly effective in identifying where changes were required to improve the measurement properties of the subscale. However, T-values were also evaluated to determine the significance of the items or the precision with which they measure the construct defined by the scale. A T-value is the ratio of the parameter estimate (e.g., the item's factor loading) to its standard error. T-values of 2.0 or greater are considered statistically significant and confirm that an item is an effective measure of the data (Berndt, 1994).

Scale reliabilities were calculated by means of the following formula (Berndt, 1994):

$$Reliability = \frac{(\Sigma\lambda_i)^2}{(\Sigma\lambda_i)^2 + \Sigma\theta_i}$$

where λ_i is the factor loading for item i, and θ_i is the measurement error variance for item i.

Goodness-of-fit indices were also provided by the LISREL analyses and served as an indication of the overall fit of the model, or in this case, how well the designated items measured the construct assumed to represent the scale or subscale. The goodness-of-fit indices generated by LISREL VII were: chi-square (χ^2); the goodness-of-fit index (GFI); the adjusted goodness-of-fit index (AGFI), which is the GFI adjusted for degrees of freedom; and the root mean squared residual (RMR). According to Jöreskog and Sörbom (1989), a good model fit would be indicated by nonsignificant and relatively low chi-square values (i.e., values should be close to the degrees of freedom), high GFI and AGFI values (i.e., close to 1.0), and low RMR values (i.e., close to 0.0).

In general, all of the subscales of the LBDQ-TL showed good measurement properties as indicated by the values of the goodness-of-fit indices and the overall reliability values. However, certain individual items were identified as poor or weak. That is, they showed low factor loadings, low R^2 values, high residual values, and nonsignificant T-

values. Based on the application of these criteria, one item from each of the following subscales was identified as weak: representation, initiating structure, role assumption, and consideration. It also should be noted that the poor measurement properties of the item in the initiating structure subscale were thought to be due primarily to its negative factor loading. As a result, the item was targeted for possible revision or reverse scoring rather than deletion. The weak items in the other subscales were targeted for potential revision or elimination. Finally, it should be noted that a small number of other items showed weak measurement characteristics (i.e., low factor loading, low R^2 value, or high measurement error) even though their T-values were statistically significant. These items were also targeted for possible revision or elimination.

Overall, the Teamness Index showed adequate measurement properties. The goodness-of-fit indices were all supportive, and all of the T-values were significant. However, two of the items (1 and 5) showed relatively high measurement error and relatively low factor loadings and R^2 values. In addition, the reliability of the scale was a modest .69. Therefore, consideration was given for revising the two weak items and incorporating additional items into the scale in order to improve reliability.

Summaries of the LISREL confirmatory factor analyses for the LBDQ-TL are presented in Appendix I, with each table

representing the results for a particular subscale. A summary of the LISREL confirmatory factor analysis of the Teamness Index is presented in Appendix J.

Principal Factor Analyses

Exploratory principal factor analyses were conducted to help determine the underlying structure of the LBT form, the KSAO Card Sort, and the 26-item, revised form of the LI Card Sort. The LBDQ-TL and the Teamness Index were not included in these analyses because their structures were tested and supported through the LISREL confirmatory factor analyses. The interview and questionnaire were not included because of the changes made to them as a result of the content review. All factor solutions were submitted to orthogonal, varimax rotation.

Leadership Behaviors and Tasks form. Because principal factor analysis uses squared multiple correlations (SMC) as the prior communality estimates, it is sensitive to the ratio of variables to observations (Gorsuch, 1974). In fact, a singular correlation matrix will be generated when the number of variables exceeds the number of observations (SAS User's Guide: Statistics, 1985). In other words, when the number of variables (in this case, 80) exceeds the number of observations (in this case, 71), SMC will produce communality estimates of 1.0, thereby changing the analysis from a principal factor analysis to a truncated principal components analysis (Gorsuch, 1974, 1988). An effective solution in this situation is to set the prior communality

estimate for each variable to its highest correlation with any other variable (Gorsuch, 1974, 1988). As such, maximum correlations rather than SMC served as the prior communality estimates for the factor analysis of the LBT form.

Eleven factors were extracted from the LBT measure based on the requirement that the retained factors account for 100% of the common variance. However, a review of the scree plot suggested that fewer factors could be retained. In particular, the scree test suggested five factors.

A review of the five-factor solution showed that several items failed to load "cleanly" on a single factor. That is, some of the items had high factor loadings on more than one factor. As a result, these items were targeted for revision or deletion. With consideration being given to factor loadings and item content, 10 items were removed from the LBT measure and three items were rewritten or replaced. The result of these modifications was a 67-item revised version of the LBT form.

A subsequent factor analysis of the revised, 67-item LBT form was then performed in which SMC served as the prior communality estimates. This subsequent analysis of the LBT form allowed a factor structure to be extracted that was most representative of the form as it would be used in Study 2. The results indicated that four factors could effectively represent the data. As such, it is the four-factor solution of the revised LBT form that is presented here and investigated in later analyses.

The first rotated factor was characterized by 21 items whose factor loadings ranged from .280 to .680. While most of the items loaded cleanly on factor one alone, five items had relatively high loadings on another factor as well (e.g., within .100 of its loading on factor one). After reviewing the items that loaded on the factor, it was interpreted as an information and performance management construct. It included several items dealing with the gathering, analysis, and dissemination of information or data. It also included a number of items related to maximizing performance, ensuring goal attainment, correcting performance problems, and managing team boundaries.

Twenty-one items loaded on the second factor, with factor loadings ranging from .376 to .757. Again, most of the items loaded cleanly on factor 2 alone; however, two items had relatively high loadings on another factor as well (e.g., within .100 of its loading on factor two). Factor two was interpreted as a teamwork management construct and included items dealing with directing and structuring the team task, monitoring and evaluating the entire team, building unity, and emphasizing a common goal.

Sixteen items loaded on the third factor, with factor loadings ranging from .319 to .713. Three items failed to load cleanly on the factor, showing relatively high loadings on a factor other than factor three. Factor three was interpreted as a consideration construct and included several items dealing with leader interaction with members,

support of team and team members, and member development activities.

Nine items loaded on the fourth factor, with factor loadings ranging from .389 to .737. While most items loaded cleanly, two items showed relatively high loadings on another factor as well. The factor was interpreted as an administrative construct. It included items dealing with such things as scheduling team activities, attending meetings, making presentations, and distributing needed resources.

Overall, the four-factor solution of the 67-item form represented a marked improvement over the five-factor solution of the original measure. In particular, the four-factor solution produced cleaner factors with higher factor loadings.

KSAO Card Sort. Although 15 factors were initially extracted from the KSAO Card Sort, a review of the scree plot suggested that four factors be retained. Furthermore, a preliminary review of the rotated factor pattern for the 15-factor solution showed that 10 of the factors were represented by only one or two items. However, "a commonly used rule-of-thumb is that there should be at least three variables per factor" (SAS User's Guide: Statistics, 1985, p. 361). Likewise, a review of empirical factor analytic studies led Gorsuch (1974, 1988) to conclude that, as a rule, there should be at least four, and preferably five or six, variables per factor. Therefore, the analysis was

repeated for a four-factor solution.

Twelve items loaded on the first factor, with factor loadings ranging from .368 to .695. All but one of the items loaded cleanly on the factor. The factor was interpreted as a management skills construct. It was represented by items related to communication skills, management skills, planning and organizing skills, etc.

Seven items loaded on factor two, with factor loadings ranging from .325 to .872. All seven items loaded cleanly on the factor. The factor was interpreted as an experience construct. It included items dealing with team and leadership experience.

Eight items loaded on factor three, with factor loadings ranging from .358 to .756. Three of the eight items also showed relatively high loadings on a factor other than factor three. Factor three was interpreted as a consideration construct, and included items dealing with commitment to the team, fairness, friendship, and sensitivity.

Finally, eight items loaded on factor four, with factor loadings ranging from .291 to .704. Four of the eight items also showed relatively high loadings on a factor other than factor four. This factor was interpreted as a cognitive construct. It included items such as cognitive skills, decision-making skills, continual learning, and knowledge of operations.

Leader Involvement Card Sort. Eight factors were extracted from the shortened, 26-item version of the LI measure. In addition, the scree plot suggested that eight factors might be appropriate. However, a preliminary review of the rotated factor pattern indicated that two of the factors were represented by less than three items. Thus, the analyses were repeated for five, six, and seven factor solutions. Based on the number of items per factor, similarity between prior and final communality estimates, and ease of interpretability, it was determined that the six-factor solution was most appropriate. In particular, the seven-factor solution contained a factor with less than three items, and the five-factor solution produced more dissimilar final communality estimates and was more difficult to interpret than the six-factor solution.

Five items loaded on the first factor, with factor loadings ranging from .571 to .854. All items loaded cleanly on the factor. This factor was interpreted as an indicator of leader training responsibilities and contained all of the items dealing with training provided by the leader.

Five items loaded on the second factor, with factor loadings ranging from .273 to .816. Most of the items loaded cleanly; however, one of the items showed a high loading on another factor as well. It should be noted that the item that failed to load cleanly on the factor was rewritten and clarified in the revised version of the

measure used in Study 2. The factor was interpreted as an indicator of team responsibility for outcomes and contained items dealing with the extent to which the team members are responsible for ensuring quality of outcomes, setting goals, reviewing output, and supporting the team.

Five items also loaded on the third factor, with factor loadings ranging from .478 to .701. All items loaded cleanly on the factor. However, one item showed a strong negative loading (-.624), suggesting that it might need to be reverse scored if it was to serve as a measure of the factor. The factor was interpreted as an indicator of leader involvement in team activities. It was represented by items addressing the extent to which the leader is involved in various team activities.

The fourth factor was also represented by five items, with factor loadings ranging from .413 to .785. All but one of the items loaded cleanly on the factor. Factor four was not easily interpreted but may be regarded as an indicator of leader traits. For example, the factor consists of items addressing the leader's extent of expertise in team positions, extent of experience, and openness to suggestions.

Three items loaded on the fifth factor, with factor loadings ranging from .509 to .711. All items loaded cleanly on the factor. This factor was interpreted as an indicator of self-direction and was made up of items addressing the extent to which the team is self-directed or

responsible for its own leadership. Based on Gorsuch's (1974, 1988) four to six variables per factor rule, this factor was targeted for additional item development.

Finally, three items loaded on the sixth factor, with factor loadings ranging from .602 to .689. All items loaded cleanly on the factor. Factor six was interpreted as an indicator of leader responsibility for outcomes. It contained items dealing with the extent to which the leader is responsible for ensuring quality of outcomes, setting goals, and reviewing output. Again, based on Gorsuch's (1974, 1988) four to six variables per factor rule, this factor was targeted for additional item development.

"Post Hoc" LISREL Confirmatory Factor Analysis

After the factor structures of the LBT, KSAO, and LI measures were determined by means of the exploratory factor analyses, LISREL confirmatory factor analyses were run to test the fit of the factor structures to the empirical data. Although certain items were identified as weak in each of the measures, suggesting the need for revision or elimination, the overall factor structures of the measures were generally well supported. Results of the LISREL analyses for the LBT form, KSAO Card Sort, and LI Card Sort are presented in Appendices K, L, and M, respectively.

Reliability Estimates and Item Analyses

Although the LISREL analyses provided item statistics and reliability estimates, internal consistency reliability estimates and item statistics were also obtained on all

relevant measures (i.e., all measures except the interview and questionnaire) by means of the RELIABILITY procedure in the SPSS-X programming package. Item statistics consisted of item means, item variances, inter-item correlations (IIC), item-total correlations (ITC), squared multiple correlations (SMC), and recomputed alpha coefficients if the item were deleted. These analyses were conducted to double-check LISREL findings and to aid in determining whether a particular item had sufficiently weak measurement properties that removing or revising it would increase overall factor or subscale reliability. The results of the reliability and item analyses are presented for each measure and are summarized in Table 4.

It should be noted that these findings coincide directly with the results of the LISREL analyses. In other words, those items identified through the LISREL confirmatory factor analysis as poor or weak (i.e., low factor loadings, low R^2 values, high residual values, or nonsignificant T-values) coincided with the items identified as poor or weak in the reliability and item analyses. Based on both the reliability and LISREL findings as well as careful consideration of the items, revisions and modifications were made to the measures.

Although there is no absolute cut-off below which the internal consistency reliability of a scale is considered unacceptable and above which it is considered acceptable, scales were targeted for modification if their reliability

Table 4

Scale and Subscale Reliabilities

Scale	Alpha	Item N	Revised Alpha	Items Removed	Expected Alpha	Items Added	Final N
Teamness Index	.69	8	--	--	.77	4	12
Leadership Behaviors & Tasks		67					
F1: Info. & Perf. Mngmnt	.93	21	--	--	--	--	21
F2: Teamwork Mngmnt	.92	21	--	--	--	--	21
F3: Consideration	.90	16	--	--	--	--	16
F4: Administration	.86	9	--	--	--	--	9
KSAO Card Sort		35					
F1: Management Skills	.82	12	.80	2	.83	2	12
F2: Experience	.86	7	.89	1	--	--	6
F3: Consideration	.78	8	.77	1	.83	3	10
F4: Cognitive	.79	8	--	--	.81	1	9

(continued)

Table 4 (continued)

Scale	Alpha	Item N	Revised Alpha	Items Removed	Expected Alpha	Items Added	Final N
LBDQ for Team Leadership		69					
Representation	.70	5	.77	1	.81	1	5
Initiating Structure	.80	14	.83	1	--	--	13
Tolerance of Freedom	.81	11	.82	1	--	--	10
Role Assumption	.70	9	.72	1	.79	4	12
Integration	.74	5	--	--	.80	2	7
Consideration	.79	13	.80	1	--	--	12
Transformational Ldrshp	.84	12	.82*	--	.83	2	14
Leader Involvement Card Sort		26					
F1: Ldr Training Rsp.	.84	5	--	--	--	--	5
F2: Team Rsp. Outcomes	.80	5	.85	1	--	--	4
F3: Ldr Invlvmnt w/Team	.38	5	.73*	--	.81	3	8
F4: Leader Traits	.70	5	.71	1	.81	3	7
F5: Self-direction	.69	3	--	--	.82	3	6
F6: Ldr Rsp. Outcomes	.74	3	--	--	.83	2	5

Note. Revised Alpha = alpha level after removing the item(s) with poor measurement properties. * = revised alpha value after reverse scoring the item with the negative factor loading on the factor or subscale. Expected Alpha = alpha estimate based on Spearman-Brown formula. Items Added = number of items added to a factor or subscale and used to calculate Expected Alpha. Final N = number of items in revised factor/subscale.

was below .80. Modifications included: (a) the elimination of items identified as sufficiently weak that their removal would increase the overall factor or subscale reliability, (b) the transfer of items from one factor or subscale to another, and (c) the creation and incorporation of additional items related to the construct being measured. The Spearman-Brown prophecy formula was used to determine the number of items that needed to be added to a factor or subscale in order to increase reliability to approximately .80 or higher. The Spearman-Brown formula is as follows:

$$r_{nn}=\frac{nr_{11}}{1+(n-1)r_{11}}$$

where r_{nn} is the estimated reliability of a measure n times as long as the original, and r_{11} is the obtained reliability coefficient.

Teamness Index. The Teamness Index showed an alpha coefficient of .69. In addition, a review of the item statistics showed that items 1 and 5 were relatively weak. However, the results did not indicate that the removal of any particular item from the measure would appreciably increase its reliability. Therefore, items 1 and 5 were revised to enhance their clarity and ensure proper interpretation. Furthermore, four additional items were created and incorporated into the scale. According to the Spearman-Brown formula, the addition of four items would increase the reliability from .69 to .77. However, the

modification of the two weak items should further increase the reliability of the revised Teamness Index to over .80.

Leadership Behaviors and Tasks form. The internal consistency reliability of the four factors extracted from the LBT form were assessed. In general, the factors showed very good reliability, with alpha's ranging from .86 to .93. Furthermore, a review of the item statistics for each of the factors suggested that all of the items had value and none was sufficiently weak that removing it would improve reliability. Therefore, no revisions were made to the LBT form as a result of the reliability and item analyses.

KSAO Card Sort. The internal consistency reliability of the factors extracted from the KSAO Card Sort ranged from .78 to .86. A review of the item statistics suggested the removal of one item. More precisely, the item statistics showed that removing the item, "having formal as opposed to informal leadership," would increase the reliability of the second factor from .86 to .89. The SMC and ITC of the item were .20 and .29 respectively. Based on this, and the item's lack of face validity on the KSAO measure, the item was removed.

Although the item statistics did not show any of the items in factor one to be particularly weak, two items were removed from the factor. The items, "above average intelligence" and "leadership stability" were removed from the factor due to their lack of salience and logical connection with the other items comprising the factor.

Rather than discarding the items altogether, however, they were revised and incorporated into a rating task on the Team Leadership Questionnaire. In particular, they were added to the list of leader traits and leadership factors rated in item 11 of the questionnaire.

The result of removing the two items from factor one was a slight decrease in reliability from .82 to .80. However, two additional items were written and incorporated into the factor, thereby increasing reliability to .83 according to the Spearman-Brown formula. In addition, one item was rewritten in order to improve its clarity and salience.

An item was also removed from the third KSAO factor due to lack of salience. While statistically related to the factor, the item "special physical abilities" was not logically related to the construct. For that reason and its redundancy with a question in the interview, the item was dropped. As a result, the reliability of factor three dropped from .78 to .77. However, three new items were also added to the factor, resulting in an increase in reliability to .83 according to the Spearman-Brown formula.

Finally, one item was added to the fourth factor, increasing its reliability from .79 to .81 according to the Spearman-Brown formula. The item added was actually the item moved from the interview to the KSAO measure as a result of the content review process described previously (i.e., the item dealing with abstract reasoning).

LBDQ for Team Leadership. The internal consistency reliability of each of the LBDQ-TL subscales was as follows: representation, .70; initiating structure, .80; tolerance of freedom, .81; role assumption, .70; integration, .74; consideration, .79; and transformational leadership, .84. An examination of the reliabilities and item statistics indicated that the reliability of five of the subscales could be improved by removing the weakest item in the subscale. In addition, the results indicated that three of the subscales were in need of additional item development in order to increase reliabilities to the .80 range. The specific modifications to the subscales are described below.

According to the item statistics, removing the item, "publicize the activities of the team," from the representation subscale would raise its reliability from .70 to .77. The SMC and ITC of the item were .01 and .10 respectively. Subsequent application of the Spearman-Brown formula indicated that adding a new item to the subscale would further increase reliability to .81. Therefore, the item "serve as the go-between or liaison between the team and higher-ups" was added to the representation subscale.

Removal of the item, "put the team's welfare above the welfare of any member in it," from the initiating structure subscale would raise its reliability from .80 to .83. The SMC and ITC of the item were .35 and -.22 respectively. As suggested by the negative ITC, this was the item with the negative factor loading discussed in factor analysis

section. As such, the item was not automatically eliminated. Instead, consideration was given to the possibility of reverse scoring. However, this made no logical sense and was not supported by its original use in the LOQ (i.e., the item was not reverse scored in the LOQ). Eliminating the item was then considered. However, it was a unique item and had potential for distinguishing among team leadership types. Therefore, revision or transfer of the item was considered. After carefully reviewing the content of the various subscales, it was decided that the item would fit well in the transformational leadership subscale if it were reverse scored. In particular, it appeared to represent the obverse of the items related to individualized consideration in the transformational leadership subscale. As a result, the item was removed from the initiating structure subscale increasing the reliability from .80 to .82, and was reverse scored and added to the transformational leadership subscale. Although the alpha level of the transformational leadership subscale dropped from .84 to .82 after adding the item, it was retained on the basis of the logic explained above. Furthermore, an additional item was incorporated into the transformational leadership subscale to help counteract the slight reduction in reliability. According to the Spearman-Brown formula, adding this item would raise the subscale reliability from .82 to slightly more than .83.

Based on the item statistics, the item, "show

reluctance in allowing the members freedom of action," should be removed from the tolerance of freedom subscale (SMC and ITC were each .24). As a result, its reliability increased from .81 to .82. Similarly, eliminating the item, "do personal favors for members of the team," from the consideration subscale raised its reliability from .79 to .80. The SMC and ITC of the item were .29 and .19.

Although removing the weak item from the role assumption subscale raised its reliability from .70 to .72, the subscale still required additional development. Therefore, four additional items were created and incorporated. According to the Spearman-Brown formula, the addition of the four items would increase reliability to over .79.

Although the item statistics did not suggest the removal of any items from the integration subscale, its modest reliability indicated the need to add items. The Spearman-Brown formula indicated that adding two items to the subscale would increase its reliability from .74 to .80. Therefore, two relevant items were created and incorporated.

Leader Involvement Card Sort. The internal consistency reliability of the six factors extracted from the LI Card Sort ranged from .38 to .84. A review of the item statistics suggested the removal of one item from factor two; namely, "to what extent must team members seek needed support and encouragement from one another rather than the team leader." Removal of this item would increase the

reliability of factor two from .80 to .85. The SMC and ITC of the item were .09 and .27 respectively. Based on this and the item's susceptibility to individual differences, the item was removed.

The item statistics also indicated the need to revise or eliminate the item, "to what extent does the leader simply oversee the operations of the team without being directly involved in contributing to the team's output," from factor three. The item had a SMC of .20 and ITC of -.39. As suggested by the negative ITC, this was the item with the strong negative factor loading discussed in the factor analysis section. In turn, the item was reverse scored rather than eliminated. This was considered a reasonable and logical alternative after reviewing the content of the items making up the factor. The result of reverse scoring the item was an increase in reliability from .38 to .73.

Despite the dramatic increase in reliability due to reverse scoring the weak item, the factor still needed further development. Application of the Spearman-Brown formula indicated that adding three new items to the factor would increase its reliability from .73 to .81. As such, three relevant items were generated and incorporated into the measure.

Removing the weak item, "to what extent does a leader's tenure or experience on the team affect the team's success," increased the reliability of factor four from .70 to .71.

However, .71 was still unacceptably low. Therefore, three additional items were created. According to the Spearman-Brown formula, the addition of these three items would increase factor reliability to .81.

Finally, the relatively low reliabilities of factors five and six suggested that additional items should be incorporated into these factors as well. According to the Spearman-Brown formula, three items should be added to factor five and two items to factor six in order to increase reliabilities to at least .80. In particular, adding three new items to factor five increased its reliability to .82 and adding two items to factor six increased its reliability to .83.

Summary. Following the revisions, the estimated internal consistency reliability of all factors and subscales ranged from a likely underestimate of .77 to .93, with an average reliability of .84. The final, revised form of each of the measures is described further in the Materials section for Study 2.

Interrater Reliability

Although no intentional effort was made in Study 1 to obtain different representatives of the same team, two such situations occurred. In particular, two members of the same rugby team and two members of the same high-school flag team participated in Study 1. As a result, an indication of the interrater reliability of the measures could be obtained. Specifically, percentage of agreement and the kappa

agreement index were calculated for each of the measures (except the interview and questionnaire because of the changes made to them). The kappa index adjusts or corrects for expected chance agreement. As such, it may be considered a more accurate indication of agreement (Ary, Covalt, & Suen, 1990). Kappa (κ) ranges from 1.0 to -1.0 with 1.0 indicating perfect agreement and -1.0 indicating complete disagreement.

Ratings were considered to be in agreement if they were identical or differed by only one point. Ratings were considered to be in disagreement if they differed by more than one point. It should be noted that the items that were to be dropped from the measures as indicated by the previous analyses were not included in the calculation of agreement. So, for example, only 31 items were compared for the KSAO Card Sort.

Teamness Index. While the representatives of the flag team showed 100% agreement (κ = 1.0) on the Teamness Index, the rugby representatives showed only 63% agreement (κ = .26), disagreeing on three items.

Leadership Behaviors and Tasks form. The representatives of the rugby team showed a very poor 44% agreement (κ = -.12) on the LBT form, disagreeing on 44 of the items. Likewise, the representatives of the flag team showed only 51% agreement (κ = .02) on this measure, disagreeing on 39 items. However, if the agreement criteria are relaxed slightly allowing two point differences to

indicate agreement, the picture changes. Allowing two point differences to indicate agreement was considered reasonable given that the LBT form utilizes a 7-point scale (0 to 6) rather than a 5-point scale like the other measures.

Recomputing agreement based on the relaxed criteria resulted in 95% agreement (κ = .90) between the rugby representatives and 84% agreement (κ = .68) between flag corp representatives. In turn, average agreement for the measure was 90% (κ = .80).

KSAO Card Sort. The representatives of the rugby team showed 90% agreement (κ = .80) on the KSAO Card Sort, disagreeing on only three of the items. The representatives of the flag team showed 77% agreement (κ = .54) on this measure, disagreeing on eight of the items. Mean agreement for the measure was 84% (κ = .68).

LBDQ for Team Leadership. The representatives of the rugby team showed 75% agreement (κ = .50) on the LBDQ-TL, disagreeing on 16 of the items. On the other hand, the representatives of the flag team showed 91% agreement (κ = .82), disagreeing on only six of the items. Average agreement for the measure was 83% (κ = .66).

With respect to subscales, the greatest disagreement occurred with the representation and initiating structure subscales for the rugby representatives. On the other hand, the flag corp representatives had their greatest disagreement on the tolerance of freedom and transformational leadership subscales.

Leader Involvement Card Sort. The representatives of the rugby team showed 84% agreement (κ = .68) on the LI Card Sort, disagreeing on only four of the items. Similarly, the representatives of the flag team showed 88% agreement (κ = .76), disagreeing on only three items. Thus, mean agreement for the measure was 86% (κ = .72).

Before judging the quality of the measures on the basis of these findings, it should be considered that agreement could have been restricted by certain factors. For example, because the representatives of the flag team were no longer members, their memory of the leadership practices may not have been as precise or consistent as it was when they were both members. In addition, the fact that all of these participants were members rather than the actual leaders may have impacted their understanding of the leadership practices. In turn, it is likely that agreement would have been higher between leaders. Considering these potential constraints, the agreement statistics were viewed as positive. Furthermore, the fact that poor agreement was not consistent across a measure suggests that lack of agreement was due more to the individual differences in perspective and memory than any psychometric weaknesses with the measures. For example, the fact that agreement was moderately low among the rugby representatives for the LBDQ measure and high for the flag corp representatives and the opposite was found on the KSAO measure suggests that disagreement is not tied to the measures or items.

CHAPTER IV

METHOD

Study 2

Participants

In Study 2, data were collected on a sample of 100 teams. More precisely, a subject matter expert (SME) from each team was interviewed and asked to complete the various measures and exercises designed to assess attributes of the team's leadership. The vast majority of SMEs (94%) were designated team leaders. The remaining 6% of participants were members of the team but not designated leaders. With respect to the sex of the SMEs, 70% of the participants were male and 30% were female. With respect to race, 89% were White/Caucasian, 10% were Black/African-American, and 1% was Hispanic. The average age of the participants was 39 years with an age range of 21 to 60 years. The average length of time that participants were associated with their team was 44 months with a range of 1 month to over 20 years. In addition, 76% of the participants were currently involved with the team being discussed while 24% were not involved with the team at the time of the data collection. Participation was voluntary and participants were not paid.

Teams were selected primarily from the greater Hampton Roads area of Virginia. However, several teams were also included from other parts of the state, and two teams from outside the state were included. In selecting the sample, a systematic effort was made to obtain a widespread and

divergent sample of team "types" that adequately represented the population of teams identified in the literature and included in other multi-team studies (Hackman, 1990; Hallam & Campbell, 1994; Larson & LaFasto, 1989; Yanushefski, 1995). The final sample consisted of 44 functional team "types" from a variety of organizations and settings. A list of the teams represented in Study 2 along with their associated frequencies is presented in Table 5.

Materials

Although the same measures utilized in Study 1 were used in Study 2, a number of changes and revisions were made to the measures. The details regarding these changes were reported in the Results section for Study 1. However, this section presents a brief summary of the changes and a description of the final form of each measure. In addition, the intended purpose or function of each measure is stated. Unless otherwise noted, the administration procedures, instructions, question and response formats, and scales remained the same as in Study 1. As such, the details of the measures are not repeated here (see Materials section for Study 1 for details).

Teamness Index. The Teamness Index utilized in Study 2 consisted of 12 items (see Appendix N). Six of the original eight items remained unchanged, two were revised to improve clarity, and four additional items were added to increase internal consistency reliability. The Teamness Index was again used to identify and distinguish between teams,

Table 5

Teams Represented in Study 2

Team	N
Golf	1
Diving	1
Soccer	3
Lacrosse	2
Softball	1
Football	1
Basketball	2
Volleyball	1
Field Hockey	2
Automotive Service Team	4
Interdepartmental Cross-Functional Training Team	1
Interdepartmental Cross-Functional Work Team	5
Organizational Planning Department	1
Manufacturing/Assembly Team	4
Remanufacturing/Reassembly Team	1
Cost Engineering/Cost Down Team	1
Ergonomic/Human Factors Design Team	2
Process Management Team	1
Navy Combat Systems Training Team	1
Navy Tactical Warfare Team	1
Navy COMSUBLANT Message Center Team	1
Quality/Process Improvement Team	12
Self-Funded Designated Service Unit	1
Interdepartmental Committee/Project Team	6
Aircraft Cockpit Crew	2
Fire Dept. Engine/Truck/Ladder Company	5
Fire Battalion	1
Fire Dept. Inspection/Investigation Team	1
FPA OSH Team (Fire Safety Team)	1
Volunteer Emergency Rescue Squad/ALS Team	5
Hazardous Materials (HAZMAT) Team	4
Technical Rescue Team	3
Boat Team/Surf-Rescue Squad	1
Emergency Dive Team	1
Sheriff's Office Emergency Response Team (SERT)	1
Building Inspections Team	5
Operations/Inspections Bureau	4
Emergency Grant Program Team	1
City SWEEPS Team	1
Office Assistants Team	1
Natural Gas Construction Crew	4
Administrative Board	1
Acting Cast/Ensemble	1
Singing/Musical Group/Ensemble	1
	100

pseudo-teams, and groups. In addition, because it was not used in the clustering process and because it focused on the team rather than the team's leadership, the Teamness Index provided dependent variable information to be used in establishing the external validity of the cluster solution.

While the guidelines used to distinguish among entities remained largely unchanged from Study 1, slight modifications were made due to the increased number of items comprising the Teamness Index in Study 2. As in Study 1, an entity was considered a "team" if it received a mean Teamness Index rating above 3.75. Likewise, an entity was again considered a "pseudo-team" if it received a mean rating between 3.00 and 3.75. However, an entity was also considered a "pseudo-team" if there were three ratings given below 3.00, regardless of the mean rating. Finally, an entity was considered a "group" if it received a mean Teamness Index rating less than 3.00, or there were more than three ratings (rather than two as in Study 1) given below 3.00.

According to these guidelines, the Study 2 sample consisted of 95 teams, three pseudo-teams, and two groups. The "pseudo-teams" consisted of the two-person cockpit crew, and two of the ambulance crews (part of the volunteer rescue system). The "groups" consisted of the individuals comprising the Emergency Grant Program (a city government agency) and a manufacturing assembly department. A review of the responses to the items comprising the Teamness Index

indicated that key factors leading to the designation of an entity as a "pseudo-team" or "group" were: (1) the lack of true interdependency in these collectives, and (2) the possibility that a single individual can perform all essential activities when required.

Team Leadership Interview. As in Study 1, eight versions of the Team Leadership Interview were designed and utilized in Study 2. The versions differed with respect to whether the SME was currently or previously affiliated with the team, whether the team had a single leader or multiple leaders, and whether the SME was a leader or a member of the team. The single-leader versions of the structured interview contained 36 primary questions and the multi-leader versions contained 38 (see Materials section of Study 1 for explanation of differences). The preliminary questions used to determine which version of the materials to utilize in each session are presented in Appendix O. The present/multi-leader/leader version of the Team Leadership Interview used in Study 2 is presented in Appendix P as an example.

The interview had two primary functions in Study 2. First, it was a key source of information about sample characteristics and the general nature of team leadership. As such, it provided data useful in identifying trends, characteristics, and profiles of all team leadership. Second, because the interview data were not used to create clusters, the interview variables served as dependent

variables in the external validation of the cluster solution.

The decision to utilize the interview as a source of dependent variable data rather than use it in the clustering process was based on several factors. One factor was the difficulty in assessing the psychometric properties of the interview in Study 1 (i.e., the interview's factor structure and factor reliabilities were unknown). As a result, psychometric weaknesses or measurement flaws that could interfere with the identification of a stable cluster solution could not be detected and eliminated prior to the interview's use in Study 2. Another factor influencing the decision was the fact that some interview items pertained to characteristics of the team rather than team leadership--the target issue of this research. A third factor considered in the decision was the fact that the interview data were descriptive and categorical in nature rather ordinal or interval. That is, the categorical data of the interview were considered less preferable than the rating data provided in other measures for use in numerical classification. The final factor impacting the decision was the simple need for dependent variables for eventual use in the external validation phase. In sum, these factors led to the decision not to utilize the interview data for clustering but rather to withhold them for the external validation phase.

Team Leadership Questionnaire. The Team Leadership Questionnaire (TLQ) used in Study 2 consisted of 12 primary questions and a separate section (i.e., the first page) requesting certain demographic information about the SME. The content of the TLQ changed significantly from Study 1, with a number of items being eliminated or rewritten and several others being transferred from other measures and integrated into the questionnaire.

As in Study 1, four versions of the TLQ were developed, varying by whether the SME was currently or previously affiliated with the team and whether the SME was a leader or member of the team. The questions and response options were designed to distinguish among single- and multi-leader differences when relevant. The present/leader version of the TLQ used in Study 2 is presented in Appendix Q as an example. As with the interview, the questionnaire served as a source of general information regarding the nature of team leadership as well as a dependent measure that provided data for the external validation of the cluster solution. Furthermore, the same basic thought process that led to the decision not to use the interview in the cluster analyses led to the same decision regarding the use of the questionnaire.

Leadership Behaviors and Tasks form. The revised LBT form consisted of 70 items (see Appendix R). Revisions were made on the basis of both the content review and statistical analyses of the measure and items. As such, the content of

the LBT form used in Study 2 was notably different from that used in Study 1. However, the instructions, format, and procedures related to the LBT form remained the same in Study 2. The LBT form was designed to determine the extent to which the various behaviors and tasks were part of the team's leadership and how important they were for effective leadership. The function of the LBT form was to provide data to be used in identifying types of team leadership by means of cluster analysis.

KSAO Card Sort. The revised KSAO Card Sort utilized in Study 2 consisted of 37 items (see Appendix S). The KSAO Card Sort was designed to assess the importance of various knowledge, skills, abilities, and other characteristics for effective team leadership. The administration of the KSAO Card Sort remained essentially unchanged from Study 1. The function of the KSAO Card Sort was to provide data to be included in the cluster analysis aimed at identifying types of team leadership.

LBDQ for Team Leadership. The revised LBDQ-TL card sort task (see Appendix T) consisted of the same seven subscales as in Study 1, but was expanded from 69 to 73 items in order to increase the internal consistency reliability of certain subscales. The measure was designed to assess the frequency with which team leaders perform various team-related actions and activities. Administration and format remained essentially unchanged. However, in Study 2, the items requiring reverse scoring were indicated

on the response sheet used by the researcher to record SME ratings. This simplified the process of scoring and entering the data into the data base. The LBDQ-TL provided data to be used in the cluster analysis and identification of team leadership types.

Leader Involvement Card Sort. The revised LI Card Sort contained 35 questions designed to assess the extent to which leaders and members are involved with each other and in various aspects of the team's leadership (see Appendix U). The administration and format of the LI Card Sort remained largely unchanged from Study 1 with one notable exception. Specifically, in sessions involving teams with multiple leaders, the SMEs were asked to provide two ratings for those items related to or addressing "the leader." The primary reason for this procedure was that it allowed differences between leader roles and responsibilities to be detected and assessed.

If the SME was a leader, the first rating was to be in reference to him- or herself as "the leader," and the second rating was to address another leader position designated by the researcher. If the SME was not a leader (i.e., a member), the researcher made the decision and designation as to which leadership positions should be considered in rating the "leader" items. The relevant items were denoted by an asterisk on the cards and by two rating spaces on the form used by the researcher to record responses.

Participants were asked to make the dual ratings just

prior to beginning the sorting task. For example, after reading the instructions and passing out the cards the researcher would inform the SME that there was a subset of cards with an asterisk on them and that these cards contained questions related to "the leader." The SME was asked to first respond to each of these questions thinking of him- or herself as "the leader" (if the SME was a leader), and then respond considering one of the other leaders (designated by the researcher) as "the leader." When more than two leader positions existed, the researcher chose the position(s) most likely to produce different responses, which, in turn, was based on a consideration of the responses given in the interview and on other measures.

It should be noted that for scoring purposes, the average of the two ratings was calculated and used as the overall item rating. This was done to provide necessary continuity among all participants and sessions. In other words, averaging allowed the LI Card Sort to be represented by 35 scores (one per item) regardless of the number of leaders actually involved in the team or considered in the ratings.

As with the LBT form, KSAO Card Sort, and LBDQ-TL, the data from the LI Card Sort were used in the clustering process and identification of team leadership types. Data from the Teamness Index, Team Leadership Interview, and Team Leadership Questionnaire were not utilized in the clustering process for the various reasons previously identified.

Procedures

The data collection procedures utilized in Study 2 were highly similar to those used in Study 1. Organizations and SMEs were contacted via phone or fax, and sessions were scheduled at the most convenient time and place for the SME. Sessions were again one-on-one with only the participant and researcher present. Participants were briefed as to the nature and purpose of the study and then asked the five preliminary questions used to identify the team that would be discussed and the appropriate version of the materials to be used. All participants were given the interview and measures in the same order. Specifically, they completed the Teamness Index, Team Leadership Interview, Team Leadership Questionnaire, LBT form, KSAO Card Sort, LBDQ-TL Card Sort, and the LI Card Sort.

For each of the card-sort tasks, the researcher read the instructions, laid out the response cards, handed the participant the stack of cards, and recorded the participant's responses on the appropriate card-sort form. After completing the last card-sort task, the participants were thanked for their participation and asked if they had any questions. Typically, each session lasted approximately 1.5 hours; however, session length ranged from an unusually short 45 minutes to an unusually long duration of over 3 hours.

CHAPTER V

RESULTS

Study 2

This chapter addresses the results of Study 2. It is divided into five primary sections. The first section describes the results of descriptive statistics calculated on the entire sample. The second section addresses the evaluation of the measurement properties of the revised measures used in Study 2. The third section addresses the cluster analysis of the data and issues related to the determination of the number of clusters present. The fourth section describes the two-sample cross-validation process used to determine the stability and accuracy of the cluster solutions. Finally, the fifth section addresses the evaluation and external validation of the cluster solutions by analysis of variance procedures using dependent data not used in the clustering process. Included in the fifth section is a description of the team leadership classification system ultimately identified and supported.

Descriptive Statistics and Sample Characteristics

Means and frequencies were calculated and analyzed to assess sample characteristics and gain an understanding of the general nature of team leadership. In addition to means and frequencies, the results of a series of paired-comparisons *t* tests are presented. The *t* tests were performed to determine if the mean difference between the highest and lowest rated items on a particular measure was

statistically significant. In turn, a significant difference between means was considered to be more meaningful and informative than simply designating the items as highest rated and lowest rated.

Teamness Index. Two items tied for the highest average rating on the Teamness Index. Specifically, item 2, "Team members share a common and valued goal, mission, or objective," and item 9, "Team members must communicate with each other in order to accomplish the team's goal, mission, or objective" each had a mean rating of 4.63. Recall that the Teamness Index utilizes a 5-point scale with a rating of 5 indicating strong agreement. The item with lowest average rating was item 5, "Individual goals are related to the goals of the team" (M = 3.88). The mean difference between item 2 and item 5 was found to be statistically significant, $t(99) = 6.97$, $p < .001$, as was the difference between item 9 and item 5, $t(99) = 6.68$, $p < .001$.

Team Leadership Interview. Responses to the interview questions were content analyzed and response frequencies were then calculated to provide information regarding team and leadership characteristics. The content coding key used to code the interview variables is presented in Appendix V. This subsection reports response frequencies for a selected set of the interview questions (i.e., those judged particularly relevant or informative by the researcher).

With respect to the number of leaders, responses indicated that every team represented in Study 2 (as in

Study 1) was led by at least one designated or recognized leader. Furthermore, 39% of the sample indicated that their team had a single leader, another 36% indicated that their team had two or three leaders, and the remaining 25% indicated that their team had four or more leaders.

As for the role of the leader(s), responses indicated that 51% of the teams were led by individuals who were active or integral members of the team in addition to being leaders. In turn, 49% of the teams indicated that their leadership came from at least one individual who was regarded as a leader but not an active or integral member of the team.

Of those teams having more than one leader, 74% stated that there was a distinct and unequal distribution of power or influence among the leaders. Only 13% indicated that all leaders shared an equal amount of power or influence over the team.

Twenty-five percent of the SMEs indicated that their team's leaders served as members before becoming leaders. Alternately, 38% indicated that their leaders were not members first. Finally, the remaining 37% stated that some leaders were members first while others were not.

With respect to operating environment, 30% of the sample indicated that the leader(s) consistently operated in the same area or environment as the team. Only 7% indicated that the leader(s) consistently operated away from the team in a separate area or environment. The rest of the sample,

63%, indicated that it varied such that some leaders operated with the team and some did not, or a certain leader operated part of the time with the team and part of the time separate from the team.

With respect to how one becomes a team leader, the three most frequently reported methods were: (a) normal selection or hiring process, (b) appointment by superior, and (c) promotion. Actual frequencies or percentages are not reported for this item because of variability in responses on the multi-leader versions (i.e., variations among leaders within the same team).

Two factors clearly stood out in the responses to the question, "What is the single most important factor that distinguishes between effective and ineffective leadership in this type of team?" The most common response (16%) was communication as related to the openness, clarity, or effectiveness of communication. The next most common response (12%) was related to being goal focused, monitoring progress toward goal attainment, or encouraging members to focus on the team's goal and strive toward it.

There was a nearly equal split between those stating that there were physical requirements for leading the team (42%) and those indicating that there were no physical requirements (43%). The remaining 15% indicated that there were physical requirements for some of the leaders but not for others.

With respect to educational requirements, most SMEs

stated that there were no educational requirements for leading the team. However, for those indicating that there were educational requirements, the two most frequent responses were specialized certification or licensure gained through specialized training and a four-year college degree. Again, actual frequencies or percentages are not reported for this item because of variability in responses on the multi-leader versions (i.e., variations among leaders within the same team).

With respect to training, 48% of the sample reported that the team leader(s) provided training to the team members, whereas 16% reported that the leader(s) did not provide training. The remaining 36% indicated that it depended on the leader, some provided training and others did not. Of those indicating that at least one leader provided training, 44% stated that task or technical training was provided, 51% indicated that both task and teamwork training was provided, and 5% stated that the leaders provided only teamwork or interaction training. Finally, 81% of the sample indicated that the leader(s) received some form of training in team leadership or team performance concepts, and 19% stated that the leader(s) received no training related to team leadership.

Although a variety of communication mediums and methods were reported, by far the most frequent means of communication between leader and members was face-to-face, verbal communication either to the entire team or individual

team members.

Only 4% of the sample indicated that the leader(s) did not evaluate the performance of the team or team members, whereas 96% stated that at least one leader evaluated performance. Furthermore, of those indicating that leaders evaluated performance, 26% stated that the leader(s) focused on individual performance, 26% stated that the leader(s) evaluated the overall team, and the remaining 48% indicated that both the team and individual members were evaluated, or that the evaluation focus varied by leader.

As for recognizing and rewarding good performance, 79% of the sample indicated that the leaders recognize good performance by individual members, 13% reported that at least one but not all of the team's leaders recognize good individual performance, and only 8% responded that the leaders do not recognize or reward individual performance. Likewise, 75% of the sample indicated that the leaders recognize good performance by the entire team, 13% reported that at least one but not all of the team's leaders recognize good team performance, and 12% responded that the leaders do not recognize or reward team performance. By far the most common means of recognizing or rewarding performance, whether individual or team, was through verbal praise.

With respect to the relative importance of teamwork skills versus technical and task skills, 29% of the sample stated that team skills are more important than task skills.

On the other hand, 10% reported that task skills are more important than team skills. However, most SMEs (61%) indicated that team skills and task skills are equally important.

As for discipline or punishment for poor performance, 58% of the sample reported that the leaders provide some form of discipline or corrective guidance, whereas 23% indicated that no discipline or punishment is provided by leaders for poor performance. The remaining 19% stated that some of the leaders provided punishment and others did not. Of those indicating that at least one leader provided discipline or punishment, 73% stated that only the specific member with the performance problem is disciplined, only 1% indicated that it is the entire team that is disciplined or punished for performance problems, and the remaining 26% indicated that the focus of the discipline varies by leader or is directed at both the individual and the team.

With respect to goal setting, 55% of the sample stated that the leader(s) set goals for the team, 9% reported that leader(s) did not set goals for the team, and 36% indicated that it depended on the leader or that goal setting was a joint process. Of those indicating that at least one leader set goals for the team, 44% reported that the leaders set very specific goals, whereas 19% reported that leaders set broad or general goals; likewise, 56% reported that leaders set challenging goals, whereas 11% reported that leaders set relatively easy goals.

When asked about the necessity of having a team leader, 74% of the sample reported that the team needed a leader to perform its tasks effectively, and 26% stated that a designated leader was not required (at least in certain circumstances) for the team to be effective.

Finally, a few common factors stood out in the responses to the final question regarding how leading a team is different from leading a group or other collective. First, 36% of the SMEs stated that the goal orientation of a team is a key difference between leading teams and groups. More precisely, they indicated that the shared or common goal of a team provides a singular focus for both leaders and members, and therefore makes leading teams easier than groups. Interestingly, the next most common response (19%) was that there is no real difference between leading teams and groups, suggesting that the same things that make someone an effective team leader are required to be an effective leader anywhere. Third and finally, the need to build a cohesive, interdependent team from a collection of diverse individuals was considered a key difference between leading a team and a group. In addition, it was considered one of the most important and most difficult aspects of team leadership.

Team Leadership Questionnaire. Frequencies were calculated on those questions from the TLQ that required SMEs to select a particular response option. On the other hand, means were calculated for those questions requiring

ratings. Therefore, both means and frequencies are reported as appropriate. The content coding key used to code the questionnaire variables is presented in Appendix V (following the interview coding key).

With respect to the stability of the team's leadership, 95% of the sample indicated that their team's leadership was moderately (55%) or very (40%) stable. Only 5% of the sample reported that their team's leadership was moderately (4%) or very (1%) unstable.

Responses to the leadership style question indicated that 20% of the sample described the style of leadership in their team as highly participative, democratic, and people-oriented, whereas 2% described the leadership style as highly directive, authoritative, and task-oriented. Similarly, 48% of the sample described the style of leadership in their team as moderately participative, democratic, and people-oriented, whereas 12% described the leadership style as moderately directive, authoritative, and task-oriented. Finally, 18% of the sample described the leadership style in their team as an even balance of the two basic styles.

Using Hackman's (1986) nomenclature, 52% of the SMEs described their teams as "manager-led," 32% described them as "self-managing," 8% described their teams as "self-designing," and 8% described them as "self-governing."

Most SMEs (83%) reported that the leader was recognized by every member of the team as "the leader." However, 9%

indicated that they were unsure if the leader was recognized by everyone as "the leader," and 8% stated that the leader was not recognized by everyone as "the leader." The most frequent reason for a lack of recognition by the members was related to having multiple team leaders, any one of which could be regarded or overlooked as "the team leader."

With respect to the importance of leadership at different stages of a team's life cycle, the majority of SMEs (78%) indicated that leadership is equally important at all stages of a team's lifespan. The next most frequent response (13%) was that leadership is most important during the initial formation of the team. Similarly, with respect to the importance of leadership at different stages of a team's activity cycle, the majority of SMEs (58%) indicated that leadership is equally important at all stages of a team's activity cycle. However, the next most frequent response (24%) was that leadership is most important when the team is engaged in its primary task for direction, control, and guidance.

There was nearly an equal distribution of responses to the question about how the leader spends a typical week. In particular, 20% stated that the leader spent the majority of his or her time with the team performing essentially the same tasks and functions; 23% indicated that the leader spent most of his or her time with the team performing distinct leadership activities; 28% stated that the leader spent most of his or her time away from the team engaged in

activities related to leading the team; and 29% indicated that the leader spent most of his or her time away from the team performing activities unrelated to the team or that leading the team was not his or her primary responsibility.

Two approaches to decision making stood out as the most frequent or common. First, 34% of the sample indicated that the leader discusses issues with the team to gather input and then, considering the input, makes the decision he or she believes is best. Second, 33% reported that decisions are reached through consensus with all members being equal parties to decision making.

With respect to the amount of authority held by the leader(s) to make decisions affecting the entire team, 51% of the participants stated that the leader had "considerable" authority, 22% indicated that the leader had "absolute" authority, another 22% reported that the leader had "some" authority, and 5% reported the authority of the leader as "none" because all decisions were joint or required approval.

With respect to the basis for the leader's power or influence over the team, 82% indicated that the leader held legitimate authority or position power, 73% stated that the leader gained influence or power through task-related expertise, 75% reported that the leader obtained power through friendship and trust with the members, only 12% indicated that the leader held coercive power, and 23% stated that leaders held reward power and influenced members

through the ability to provide desired outcomes.

Of the leadership characteristics or factors rated for importance, "leadership stability" was rated highest or most important for leadership effectiveness (M = 4.00), and "race" was rated lowest or least important to leadership effectiveness (M = 1.26). In addition, the mean difference between the items was statistically significant, $t(99) = 7.39$, $p < .001$. The rating scale utilized ranged from 1 to 5 with 1 being irrelevant and 5 being critical to effectiveness. In general, the means were lowest for demographic factors such as race, age, and gender; highest for factors such as personality, stability, and intelligence; and moderate for factors related to experience.

Finally, with respect to sources of leadership, the highest rated source was "the team's overall goal, mission, or objective" (M = 3.91), followed by "a designated leader who is also a member of the team" (M = 3.62). The lowest rated source of leadership was "an informal leader outside the team" (M = 1.90). The mean difference between the highest and lowest rated items was statistically significant, $t(99) = 16.84$, $p < .001$. The rating scale associated with the question ranged from 1 to 5 with 1 indicating that it is not a source of leadership for the team and 5 indicating a primary source of direction and leadership.

Leadership Behaviors and Tasks form. The five items with the highest mean ratings and the five items with the lowest mean ratings are reported as the descriptive statistics for the LBT form (as well as the KSAO Card Sort, LBDQ-TL, and LI Card Sort). This allowed for trends or profiles to be identified and hypotheses to be generated. However, only the results are reported here.

The five leadership behaviors and tasks with the highest overall ratings (i.e., sum of extent of involvement rating and importance rating) were: (a) "supporting the efforts of all members; standing behind the team" (M = 5.45), (b) "listening to team members" (M = 5.40), (c) "emphasizing working towards a common goal" (M = 5.36), (d) "planning team tasks and activities" (M = 5.26), and (e) "motivating or inspiring members to perform and perform well" (M = 5.20) and "fostering team morale and team spirit" (M = 5.20). The 7-point scale associated with the LBT form ranged from 0 to 6 with 6 indicating major involvement and major importance.

The five behaviors and tasks with the lowest overall ratings were: (a) "disciplining the entire team" (M = 3.10), (b) "negotiating with outsiders regarding team issues" (M = 3.20), (c) "making presentations regarding team activities to individuals or groups outside the team" (M = 3.31), (d) "managing boundaries; protecting the team from outside influences" (M = 3.53), and (e) "disciplining individual members" (M = 3.55). Again, the mean difference

between the highest and lowest rated items was statistically significant, $t(99) = 11.86$, $p < .001$.

KSAO Card Sort. The five KSAOs rated most important to effective team leadership were: (a) "personal commitment to the team's goal" ($M = 4.63$), (b) "problem-solving skills" ($M = 4.45$), (c) "oral communication skills" ($M = 4.44$), (d) "personal commitment to the team and team members" ($M = 4.43$), and (e) "fairness and impartiality toward all members" ($M = 4.40$). The measure's 5-point scale ranges from 1 to 5 with 5 being "critical, essential for successful leadership."

Alternately, the five lowest rated KSAOs were: (a) "skill, talent, or expertise in performing the team tasks; being an expert in each team position" ($M = 2.98$), (b) "previous experience as a leader of this type of team" ($M = 3.02$), (c) "previous experience as a member of this type of team" ($M = 3.04$), (d) "previous experience as a member of a team, regardless of team type" ($M = 3.10$), and (e) "previous team leadership experience, regardless of team type" ($M = 3.26$). The mean difference between the highest and lowest rated items was statistically significant, $t(99) = 12.79$, $p < .001$.

LBDQ for Team Leadership. The LBDQ-TL utilized a 5-point frequency scale ranging from 1 to 5 with 1 indicating a behavior that is never performed and 5 indicating a behavior that is always performed. As such, the five most frequently occurring behaviors and five least frequently

occurring behaviors are reported here. The five most frequently occurring leadership activities or behaviors were: (a) "take charge if emergencies arise" (M = 4.51), (b) "keep members informed of relevant events" (M = 4.40), (c) "show a willingness to lead" (M = 4.39), (d) "encourage interaction among members" (M = 4.37), and (e) "keep the members working together as a team" (M = 4.36).

The five least frequently occurring leadership activities were: (a) "put the welfare of a member above the team's welfare" (M = 2.33), (b) "interact socially with members of the team" (M = 3.08), (c) "permit the team to set its own pace" (M = 3.08), (d) "let the members do the work the way they think best" (M = 3.41), and (e) "decide what should be done and how it will be done" (M = 3.43). Results of the t test showed that the mean difference between the highest and lowest rated items was statistically significant, $t(99) = 15.08$, $p < .001$.

Leader Involvement Card Sort. A review of the means associated with the LI Card Sort task suggested that team leaders frequently encourage open communication among members (M = 4.40), that they are frequently open or receptive to input from members (M = 4.33), and that they often allow (M = 4.22) and encourage (M = 4.14) members to freely advance their opinions, ideas, and concerns. In addition, the designated team leader is frequently responsible for ensuring that the team completes its task, mission, or project (M = 4.24) and is also frequently held

accountable for the quality of the team's outcomes (M = 4.14). The measure's 5-point scale ranges from 1 to 5 with 5 equating to "completely; entirely; always."

On the other hand, the leader is seldom considered "just another member of the team" (M = 2.71). The team only seldom or occasionally determines its own workload (M = 2.73), schedule (M = 2.83), or roles (M = 2.96), and on average, teams are self-directed only to a moderate degree (M = 2.92). Once again, the results of the paired comparisons t test showed that the mean difference between the highest and lowest rated items was statistically significant, $t(99) = 14.13$, $p < .001$.

Evaluation of Psychometric Properties of Revised Measures

Because all of the team leadership measures were revised to some extent, it was necessary to re-evaluate their measurement properties. Therefore, many of the analyses conducted to evaluate the measures used in Study 1 were utilized to evaluate the revised measures used in Study 2. For clarity, the evaluation process, including the steps and rationale involved, is described before the results are presented.

Evaluation Process

The first step in the psychometric evaluation process was to determine how well the factor structures identified in Study 1 held up with the data from Study 2. However, the evaluation of factor stability was conducted only on the Teamness Index, LBDQ-TL, KSAO Card Sort, and LI Card Sort.

The Team Leadership Interview and Team Leadership Questionnaire were not included at this stage because their factor structures were not determined in Study 1 due to significant content-based revisions. The LBT form was not included because the content of the form used in Study 2 was different from that used in Study 1 and on which the factor structure was based.

The initial evaluation of factor stability was done by means of internal consistency reliability analyses. In general, if the factor reliabilities were equivalent to those obtained in Study 1 or expected on the basis of adding and deleting items (see Table 4), then the factor structure of the measure was considered to be stable and additional analyses of these factors (e.g., LISREL confirmatory factor analyses) could be conducted. On the other hand, if factor reliabilities fell short of those obtained or estimated in Study 1, then the factors were considered unstable and exploratory factor analyses were conducted on the measure with data from Study 2.

Exploratory principal factor analyses were then conducted on the remaining measures--the Team Leadership Interview, Team Leadership Questionnaire, and LBT form. Once the factor structures were identified for all measures, internal consistency reliability and item analyses were performed to evaluate and refine the factors. The refined factors or subscales for all measures were then evaluated by means of LISREL confirmatory factor analyses.

Finally, the factors and subscales representing the measures to be used in the clustering procedures (i.e., LBT form, KSAO Card Sort, LBDQ-TL, and LI Card Sort) were submitted to a principal components analysis as a means of data reduction and to ensure the orthogonality of the attributes used for clustering.

Reliability and Stability of Study 1 Factors

Teamness Index. The internal consistency reliability of the Teamness Index used in Study 2 was .75. Although this was below the estimated alpha value of .77, the scale's reliability was not considered sufficiently below the expected level to suggest that it was unreliable or multidimensional. Therefore, the Teamness Index was analyzed as a unidimensional scale in the subsequent LISREL analyses.

LBDQ for Team Leadership. In general, the internal consistency reliability of the LBDQ-TL subscales was equal to or greater than expected from the Study 1 evaluation, thereby supporting the stability of the subscales. In addition, the associated item statistics indicated that the removal of a single weak item from two of the subscales could even further enhance their internal consistency reliability. In particular, it was discovered that the reliability of the consideration subscale and transformational leadership subscale could be improved by removing the weakest item from each. The comparison of expected and actual reliabilities along with the revised

reliabilities of the consideration and transformational leadership subscales are presented in Table 6.

Table 6

Comparison of Expected and Actual Reliabilities for LBDQ-TL

Subscale	Expected Alpha	Actual Alpha	Revised Alpha
Representation	.81	.81	--
Initiating Structure	.83	.80	--
Tolerance of Freedom	.82	.83	--
Role Assumption	.79	.81	--
Integration	.80	.84	--
Consideration	.80	.81	.82
Transformational Leadership	.83	.85	.88

KSAO Card Sort. The stability of the four KSAO factors identified in Study 1 was not well supported in Study 2. In other words, the actual reliability values for the four factors fell short of expected levels. A comparison of the expected and obtained alpha values is presented in Table 7. The results indicate that the four factors extracted in Study 1 do not adequately represent the data obtained in Study 2. Therefore, it was decided that the KSAO Card Sort would be factor analyzed with Study 2 data, and that the

resulting factors would be utilized in subsequent Study 2 analyses.

Table 7

Comparison of Expected and Actual Reliabilities for KSAO Card Sort Factors

Factor	Expected Alpha	Actual Alpha
1: Management Skills	.83	.74
2: Experience	.89	.86
3: Consideration	.83	.77
4: Cognitive	.81	.76

Leader Involvement Card Sort. As with the KSAO factors, the stability of the six LI Card Sort factors identified in Study 1 was not well supported in Study 2. While some of the reliabilities were actually higher than expected, the reliability of other factors was well below expected levels. A comparison of the expected and obtained alpha values is presented in Table 8. The results indicate that the six factors extracted in Study 1 do not adequately represent the data obtained in Study 2. Therefore, it was decided that Study 2 LI Card Sort data would be factor analyzed, and that the resulting factors would be employed in subsequent Study 2 analyses.

Table 8

Comparison of Expected and Actual Reliabilities for LI Card Sort Factors

Factor	Expected Alpha	Actual Alpha
1: Leader Training Resp.	.84	.79
2: Team Responsibilities	.80	.70
3: Leader Involvement	.81	.83
4: Leader Traits	.81	.75
5: Self-Direction	.82	.87
6: Leader Responsibilities	.83	.78

Principal Factor Analyses

Exploratory principal factor analyses were conducted to determine the underlying structure of the following measures: KSAO Card Sort, LI Card Sort, LBT form, Team Leadership Questionnaire, and the Team Leadership Interview. In each case, the scree plot was examined to determine the appropriate number of factors. All factor solutions were submitted to orthogonal, varimax rotation.

Although many of the measures went through an iterative factor extraction and evaluation process, only the results of the final factor patterns are presented. Nonetheless, it should be noted that the iterative evaluation process

involved the following steps: (a) identifying and extracting an initial factor structure, (b) evaluating the internal consistency reliability of the factors, (c) identifying and eliminating weak items where warranted, (d) factor analyzing the surviving items to determine if the factor pattern had changed and to generate factor scores needed for subsequent analyses, and (e) examining the internal consistency reliability of the final factors. Again, only final factor structures for the measures are reported.

KSAO Card Sort. When Study 2 data were utilized, three, rather than four, factors were extracted from the KSAO Card Sort. Through the iterative process described above, three items were eventually eliminated from the measure leaving 34 items comprising the three factors of the measure. Eighteen items loaded on the first factor, which was interpreted as an "interpersonal & interactive" KSAO construct. Factor loadings ranged from .30 to .68. Eleven items loaded on the second factor, which was labeled "process management" KSAOs. Factor loadings ranged from .39 to .70. Finally, five items loaded on the third factor, "experience," with factor loadings ranging from .68 to .79. It is interesting to note the similarity between the first two factors extracted from the KSAO Card Sort and the two main KSA areas (i.e., interpersonal KSAs and self-management KSAs) identified by Stevens and Campion (1994) and discussed on pages 9-10.

Leader Involvement Card Sort. The LI Card Sort was ultimately represented by five factors and 31 items (4 weak items were eliminated). The first factor contained 10 items, with factor loadings ranging from .45 to .79. The factor was labeled "leader responsibilities" and concerned the extent to which the team leader is responsible for various processes and outcomes. Seven items loaded on the second factor, with loadings ranging from .39 to .82. The factor was labeled "self-direction." Factor three, labeled "openness," consisted of five items with loadings of .65 to .88. It concerned the extent to which the leader supported open communication and was open to input, questions, and concerns of members. Factor four contained six items with factor loadings ranging from .56 to .84. It concerned "leader involvement with team." Finally, the fifth factor consisted of three items with factor loading of .64 to .75. The factor was labeled "team member responsibilities" and concerned the extent to which team members are responsible for various processes and outcomes.

Leadership Behaviors and Tasks form. Five principal factors were extracted from the LBT form. One item was eventually eliminated from the measure leaving 69 items comprising the five factors of the measure. Twenty-three items loaded on the first factor, with factor loadings ranging from .34 to .76. After reviewing the items comprising the factor, it was labeled "process management & guidance to goals." Fifteen items loaded on the second

factor which was labeled "team building & motivation." Factor loadings ranged from .34 to .80. The third factor, labeled "initiating structure," comprised 10 items. Factor loadings ranged from .41 to .69. Eleven items loaded on the fourth factor, labeled "facilitation & support," with factor loadings ranging from .33 to .73. Finally, 10 items comprised the fifth factor, labeled "boundary management." Factor loadings for the fifth factor ranged from .42 to .67.

Team Leadership Questionnaire. Six principal factors were extracted from the 30 variables comprising the TLQ. Five items loaded on the first factor which was labeled "leader background" and related to the perceived importance of various traits and background factors of the leader. Factor loadings ranged from .56 to .60. The second factor comprised seven items and was labeled "autonomy/self-direction." Loadings on the second factor ranged from .25 to .52. Three items loaded on third factor, "leader demographics," with loadings ranging from .60 to .75. The factor concerned the perceived importance of various leader demographic factors for leadership effectiveness. The fourth factor consisted of five items, with loadings ranging from .35 to .60. The factor was labeled "substitutes for leadership" and indicated the extent to which teams receive leadership from sources other than a designated team leader. The five items loading on the fifth factor (loadings ranged from .30 to .73) concerned the power base of the leader. As such, the factor was labeled "leader power." The sixth and

final factor comprised five items with factor loading ranging from .23 to .55. This factor was labeled "leader-member relations" and addressed things such as the friendship among leader and members, recognition of the leader, and the formality of the leader role.

Team Leadership Interview. Attempts to extract principal factors from the Team Leadership Interview were largely unsuccessful. First, the scree plot showed a smooth curve that failed to indicate how many factors should be extracted. Second, even with various numbers of factors extracted, there were items that failed to load cleanly on a single factor and some items that consistently showed low factor loadings (i.e., below .30). Third, several factors consistently contained high negative factor loadings, indicating that the coding or "scoring" of the item needed to be reversed to appropriately reflect the factor on which it was loading. Fourth, the most reasonable factor structures always included factors with only two or three items. Finally, the reverse scoring of items with negative loadings, the elimination of particularly weak items, and the elimination of variables associated with follow-up questions failed to result in the extraction of an acceptable factor pattern. Therefore, it was concluded that the factor structure of the Team Leadership Interview would not be extracted for this research, and no subsequent analyses of the interview's psychometric properties would be conducted. However, selected items (rather than factors)

from the Team Leadership Interview would be used as dependent variables in the external validation process.

LISREL Confirmatory Factor Analyses

LISREL VIII replaced LISREL VII for the confirmatory factor analyses of Study 2. LISREL VIII has the advantage of producing a wider variety of goodness-of-fit indices, some of which are better indicators of scale quality or model fit than those produced by LISREL VII.

The results reported for Study 2 again included the factor loadings, measurement error estimates, and squared multiple correlations for each item. In addition, the chi-square statistic was again reported because of its frequent usage in the literature. It should be reiterated that nonsignificant chi-squares are desirable and indicative of good model fit. The goodness-of-fit index (GFI) was also reported in Study 2 as it was in Study 1. However, the adjusted goodness-of-fit index (AGFI) reported in Study 1 was replaced by the comparative fit index (CFI) and the nonnormed fit index (NNFI) in Study 2. The biggest advantage of these indices is that they are unbiased by sample size (Berndt & Dickinson, 1995). The CFI and NNFI range in value from 0.0 to 1.0, with values of .90 or higher indicating an excellent fit. Likewise, the root mean square error of approximation (RMSEA) was provided in place of the root mean squared residual (RMR). The RMSEA reflects the amount of error of fit per degree of freedom for the population (Steiger, 1990). A value of .05 or less suggests

a close fit, with values up to .08 representing reasonable errors and reasonable fit. T-values were again reported and used to identify weak items within a subscale or factor. Factor and subscale reliabilities were obtained through separate reliability and item analysis programs.

LISREL confirmatory factor analyses were run to test the fit of the factor structures to the empirical data. That is, LISREL was used to test the factor structures of the KSAO Card Sort, LI Card Sort, LBT form, and TLQ that were determined through the exploratory factor analyses. In addition, the Teamness Index and subscales of the LBDQ-TL were submitted to LISREL confirmatory factor analyses.

Results of the LISREL analyses for the KSAO Card Sort, LI Card Sort, LBT form, TLQ, LBDQ-TL, and Teamness Index are presented in Appendices W, X, Y, Z, AA, and BB, respectively. In general, the fit of the factors was satisfactory and the factor structures of the various measures were supported. However, certain items were identified as weak in the Teamness Index and the Team Leadership Questionnaire (i.e., nonsignificant T-values were obtained for some items). While, these results would suggest the removal of the weak items to improve model fit, the subsequent reliability and item analyses indicated that the removal of these weak items would often reduce, rather than increase, reliability. Therefore, no changes were made to the measures as a result of the LISREL analyses.

Reliability of Study 2 Factors and Subscales

The internal consistency reliability of each scale, subscale, or factor utilized in Study 2 is reported in Table 9. In nearly every case, the reliability of the scale or subscale used in Study 2 meets or exceeds the reliability obtained or expected from Study 1. As such, the reliability of the subscales can be regarded as generally quite good, with the notable exception of the factors comprising the Team Leadership Questionnaire. Several of the TLQ subscales showed rather weak internal consistency reliability.

Although the modest reliabilities of the TLQ factors should be noted, they were not regarded as a serious concern because the TLQ data were not used in the clustering process. Likewise, the fact that a clear factor structure was not extracted from the interview data was of some concern, but it was not a critical concern because interview data were not used to create clusters.

Principal Components Analysis

While factors within a given measure were ensured to be orthogonal as a result of varimax rotation, factors could still correlate across measures. However, cluster analysis procedures must utilize uncorrelated attributes to be most effective. Therefore, scores from the 20 factors and subscales representing the LBT form, LBDQ-TL, KSAO Card Sort, and LI Card Sort were submitted to a principal components analysis to identify a subset of uncorrelated, higher-order components representing all four scales.

Table 9

Final Scale and Subscale Reliabilities

Scale & Subscales	Alpha	N
Teamness Index	.75	12
Leadership Behaviors & Tasks		
F1: Process Management	.94	23
F2: Team Building & Motivation	.90	15
F3: Initiating Structure	.86	10
F4: Facilitation & Support	.83	11
F5: Boundary Management	.84	10
KSAO Card Sort		
F1: Interpersonal & Interactive KSAOs	.85	18
F2: Process Management KSAO	.85	11
F3: Experience	.88	5
LBDQ for Team Leadership		
Representation	.81	5
Initiating Structure	.80	13
Tolerance of Freedom	.83	10
Role Assumption	.81	12
Integration	.84	7
Consideration	.82	11
Transformational Leadership	.88	13
Leader Involvement Card Sort		
F1: Leader Responsibilities	.89	10
F2: Self-Direction	.87	7
F3: Openness	.89	5
F4: Leader Involvement w/Team	.84	6
F5: Team Member Responsibilities	.75	3
Team Leadership Questionnaire		
F1: Leader Background	.72	5
F2: Autonomy/Self-Direction	.58	7
F3: Leader Demographics	.70	3
F4: Substitutes for Leadership	.54	5
F5: Leader Power	.54	5
F6: Leader-Member Relations	.43	5

A review of the factor pattern and scree plot produced by the analysis indicated that six principal components could effectively represent the data. The first principal component consisted of seven factors or subscales, with factor loadings ranging from .56 to .82. The component consisted of many of the consideration-related factors. Specifically, it was made up of the consideration, integration, tolerance of freedom, and transformational leadership scales from the LBDQ-TL; the "interpersonal & interactive" factor from the KSAO Card Sort; the "openness" factor from the LI Card Sort; and the "team building & motivation" factor from the LBT form.

The second principal component consisted of five of the factors or subscales, with factor loadings ranging from .59 to .80. The component was defined by the role assumption and initiating structure scales of the LBDQ-TL, the "leader responsibilities" factor of the LI Card Sort, the "process management & guidance to goals" factor from the LBT form, and the "process management" factor from the KSAO Card Sort.

Three factors loaded on the third principal component, with factor loadings ranging from .63 to .72. In particular, the "facilitation & support" factor from the LBT form, the "self-direction" factor from the LI Card Sort, and the "experience" factor from the KSAO Card Sort.

The fourth principal component was represented by two factors. Specifically, the "initiating structure" factor from the LBT form loaded .76, and the representation scale

from the LBDQ-TL loaded .74. Similarly, two factors loaded on the fifth principal component. The "boundary management" factor from the LBT form loaded .82, and the "team member responsibilities" factor from the LI Card Sort loaded .54.

Finally, the sixth principal component was defined by a single factor--the "leader involvement with team" factor from the LI Card Sort which loaded .90. Together, the six principal components accounted for approximately 70% of the variance in the factors. Scores on these six principal components served as the data for the subsequent cluster analyses.

Cluster Analysis

The first step in the cluster analysis process was to divide the sample into two groups in preparation for the subsequent cross-validation process. As such, the original sample of 100 teams was divided into two subsamples (i.e., Sample A and Sample B), each containing 50 teams. The division of the sample was done as an odd-even split, whereby Sample A contained all entities assigned odd subject numbers and Sample B contained all entities assigned even subject numbers. Because subject numbers were assigned consecutively as entities participated (from 1 to 100), the odd-even split of the sample ensured that any variability in administration that may have occurred over the course of data collection would be evenly distributed within each subsample.

Each subsample was then independently cluster analyzed

by means of Ward's method of hierarchical agglomerative cluster analysis. The data utilized in this process were the scores from the six higher-order principal components extracted from the 20 factors making up the LBT form, KSAO Card Sort, LBDQ-TL Card Sort, and the LI Card Sort.

Identifying the Number of Clusters

The cubic clustering criterion (CCC) was to be used as the means of determining the number of clusters present in the present classification effort. However, all of the CCC values generated were negative. This can be seen in Tables 10 and 11, which present the obtained R^2, expected R^2, and CCC values associated with the last 10 mergings resulting from the cluster analysis of Samples A and B, respectively.

Negative CCC values are problematic because it is positive values of the CCC that indicate the obtained R^2 is greater than would be expected if sampling from a uniform distribution, and therefore indicate the possible presence of clusters (Sarle, 1983). Furthermore, it is the maximum positive value of the CCC that is typically used to identify the proper number of clusters present (Sarle, 1983). Thus, given the parameters of the CCC and the negative values obtained in the present study, it might seem reasonable to conclude that no clusters or distinct types of team leadership exist. However, it must be noted that negative values of the CCC are not necessarily indicative of a lack of clusters. In fact, negative values of the CCC can result from the standardization of data (as was done in the present

Table 10

Results of Ward's Minimum Variance Cluster Analysis for Sample A

Number of Clusters	R^2	Expected R^2	CCC
10	.653	.696	-2.46
9	.615	.669	-2.99
8	.573	.638	-3.44
7	.523	.603	-4.13
6	.456	.558	-4.65
5	.388	.502	-4.69
4	.310	.430	-4.51
3	.219	.334	-4.16
2	.116	.205	-3.51
1	.000	.000	0.00

Table 11

Results of Ward's Minimum Variance Cluster Analysis for Sample B

Number of Clusters	R^2	Expected R^2	CCC
10	.682	.701	-1.13
9	.651	.675	-1.39
8	.611	.645	-1.86
7	.557	.610	-2.82
6	.497	.570	-3.46
5	.432	.514	-3.47
4	.355	.442	-3.31
3	.258	.342	-3.06
2	.146	.200	-2.23
1	.000	.000	0.00

effort) or from data coming from long-tailed distributions with extreme values in the tails (Sarle, 1983). Therefore, even though the negative CCC values produced in the present research cannot be used to identify the types of team leadership that may exist, they also cannot be taken as proof that no clusters or distinct leadership types exist.

Although other stopping rules could have been considered as a way of determining whether or not clusters exist, and if so, how many exist, a more direct empirical approach was taken in the present research. Specifically, nine separate cluster solutions were generated from each of the subsamples. For each subsample, the nine solutions ranged from a two-cluster partitioning of the data to a ten-cluster partition. These various partitions or cluster solutions were compared in the subsequent two-sample cross-validation process to determine which solution was the most stable and accurate. This iterative approach to identifying or selecting the optimal cluster solution had the advantage of being completely data-based and objective.

Two-Sample Cross-Validation of the Cluster Solutions

The two-sample cross-validation process proposed by McIntyre and Blashfield (1980) was used to determine the stability and estimate the accuracy of the nine cluster solutions. Based on the cross-validation results, the most stable and accurate solution(s) would be identified and evaluated in further analyses. The two-sample cross-validation process utilizes a nearest-centroid procedure for

assigning entities from a holdout sample (i.e., Sample B) to the clusters identified in the derivation sample (i.e., Sample A). Therefore, the first step in the cross-validation process was to compute the cluster centroids for each of the nine cluster solutions of Sample A. The next step was to compute the squared Euclidean distance between each entity in Sample B and each centroid in Sample A. Each entity in Sample B was then assigned to the nearest cluster centroid from Sample A. Thus, a cluster solution for Sample B was produced based on the characteristics of Sample A.

In the final step of the cross-validation process, the cluster solutions of Sample B data obtained by means of Ward's method were compared to the "cluster" structures produced by the nearest-centroid assignment procedure. In particular, the extent of agreement between the two partitions of the same data (i.e., Sample B) was computed to assess the stability and accuracy of the solutions. According to McIntyre and Blashfield (1980), the agreement statistic provides a direct estimate of the stability of the cluster solution and an indirect estimate of how accurately the solution matches the actual cluster structure in the data. Thus, the greater the agreement between partitions, the greater their stability and accuracy.

The Hubert and Arabie adjusted Rand index is generally considered the best available criterion for determining the extent of agreement between cluster solutions (Milligan & Cooper, 1986, 1987). As such, it was the agreement

criterion used in the nearest centroid cross validation. The Rand index itself is based on the correspondence between how entity pairs from two subsets of a larger data set are classified or partitioned (Rand, 1971). Two forms of agreement are possible between entity pairs: (a) agreement that two entities be assigned to the same cluster, and (b) agreement that two entities be assigned to different clusters. Thus, two partitions or cluster solutions that produce relatively large levels of agreement and relatively low levels of disagreement may be considered similar (Hubert & Arabie, 1985). However, because agreement between entities can occur by chance, it is necessary to adjust the Rand index to correct for chance. The Hubert and Arabie (1985) adjustment has been found to provide the most accurate correction for chance and, in turn, the Hubert and Arabie adjusted Rand index currently is considered the best available measure of cluster solution agreement (Milligan & Cooper, 1986, 1987).

The formulas associated with the Hubert and Arabie adjusted Rand index were compiled from several sources (Hubert & Arabie, 1985; Milligan & Cooper, 1986; Milligan & Schilling, 1985) and are provided on the following page. The index can take a value ranging from 0.0 to 1.0. A 0.0 would indicate no agreement and a 1.0 would indicate complete agreement. Thus, high positive values provide supporting evidence for the validity (stability and accuracy) of the cluster solution. The computer program

Adjusted Rand Index = $(a + d - n_c)/(a + b + c + d - n_c)$

where:

a = the number of pairs where the procedure correctly placed entities in the same cluster

$$=\Sigma\Sigma n_{ij}^2/2 - n/2$$

b = the number of pairs where the procedure placed entities together when they actually come from different clusters in the true criterion solution

$$=\Sigma n_{i.}^2/2 - \Sigma\Sigma n_{ij}^2/2$$

c = the number of pairs where the procedure failed to place entities in the same cluster when they actually come from the same cluster in the true criterion solution

$$=\Sigma n_{.j}^2/2 - \Sigma\Sigma n_{ij}^2/2$$

d = the number of pairs where the procedure correctly placed entities in different clusters

$$=\Sigma\Sigma n_{ij}^2/2 + n^2/2 - \Sigma n_{i.}^2/2 - \Sigma n_{.j}^2/2$$

n_c = Hubert & Arabie adjustment for chance agreement

$$n_c = [n(n^2+1) - (n+1)\Sigma n_{i.}^2 - (n+1)\Sigma n_{.j}^2 + 2\Sigma\Sigma n_{i.}^2 n_{.j}^2/n] / [2(n-1)]$$

where: n_{ij} = the number of entities in cluster i as produced by the clustering algorithm that also are in cluster j of the true criterion solution. Thus, $n_{i.}$ and $n_{.j}$ are marginals and n is the grand total.

written for the computation of the adjusted Rand index is presented in Appendix CC.

The agreement statistics (i.e., Rand, Expected Rand, and Adjusted Rand) associated with the various cluster solutions are presented in Table 12. The results show that the five-, six-, and seven-cluster solutions are generally superior to the others as indicated by the higher adjusted Rand indexes. However, the results do not clearly indicate which of the three solutions is best or most appropriate due to the nearly identical adjusted Rand indexes. Therefore, the five-, six-, and seven-cluster solutions were each evaluated in the subsequent phase--external validation.

Table 12

Statistics for Assessing Match Between Sample B Cluster Solutions via Ward's Method and Nearest Centroid Assignment

Cluster Solution	Rand Statistic	Expected Rand	Adjusted Rand
2-cluster	.7257	.5090	.4413
3-cluster	.6408	.5024	.2782
4-cluster	.6433	.5687	.1729
5-cluster	.8474	.6632	.5468
6-cluster	.8604	.6928	.5456
7-cluster	.8620	.6937	.5496
8-cluster	.8535	.7243	.4685
9-cluster	.8780	.7478	.5160
10-cluster	.8620	.7686	.4038

To better understand the similarities and differences among the five-, six-, and seven-cluster solutions, the teams represented in each cluster were identified and used to define the cluster compositions. The composition of the five-, six-, and seven-cluster solutions from Sample A is presented in Appendix DD. Likewise, the composition of the five-, six-, and seven-cluster solutions from Sample B is presented in Appendix EE. Finally, the composition of the three solutions from Sample B by means of the nearest centroid procedure is presented in Appendix FF.

External Validation of the Classification System

The goal of the external validation process was to provide evidence of the classification system's generalizability and overall meaningfulness or utility. As such, MANOVAs were conducted to determine the effect of team leadership classification (i.e., cluster assignment) on relevant team leadership variables not used in the clustering process. In this case, the relevant dependent variables were the attributes and factors assessed by the Teamness Index, the Team Leadership Interview, and the Team Leadership Questionnaire.

In order to increase sample size and power, Samples A and B were combined in this phase. Specifically, the entities in Sample A were coded with respect to their assignment in the five-, six-, and seven-cluster solutions generated by means of Ward's method. The entities in Sample B were coded with respect to their assignment in the five-,

six-, and seven-cluster solutions obtained in the nearest centroid clustering process. The number of entities per cluster of these combined samples is displayed in Table 13.

Table 13

Number of Entities in Each Cluster of Each Cluster Solution in Combined Sample Used for External Validation

	Cluster Solution		
Cluster	5	6	7
1	18	17	15
2	21	21	22
3	31	24	25
4	19	18	16
5	11	12	10
6	--	8	9
7	--	--	3

In every case, the MANOVA results for the five-cluster solution produced higher Wilks' Lambda and F values and generally lower exact probability values than either the six- or seven-cluster solutions (see Appendix GG for comparisons). As a result, the five-cluster solution was

considered the best, and only the results related to the five-cluster solution are presented here. The composition of the five-cluster solution for the combined sample is presented in Table 14.

MANOVA Results

MANOVA results showed a significant main effect of team leadership type (i.e., cluster assignment) on each of the dependent measures. Specifically, the results of the MANOVA utilizing the 12 Teamness Index items as the dependent variables showed an overall main effect of leadership type, Wilks' Lambda = .3754, $F(4, 48) = 1.96$, $p < .01$. In addition, the results of the MANOVA utilizing the six factors extracted from the Team Leadership Questionnaire as the dependent variables showed an overall main effect of team leadership type, Wilks' Lambda = .4130, $F(4, 24) = 3.79$, $p < .01$. The results of the MANOVA utilizing 24 items from the Team Leadership Interview (i.e., those related to leader behaviors) as the dependent variables showed an overall main effect of team leadership type, Wilks' Lambda = .1847, $F(4, 96) = 1.59$, $p < .01$. Finally, the MANOVA utilizing 11 items from the Team Leadership Interview (i.e., those related to characteristics of the team or leader) as the dependent variables showed an overall main effect of team leadership type, Wilks' Lambda = .4783, $F(4, 44) = 1.58$, $p < .05$.

Table 14

Five-Cluster Solution for Combined Sample

Cluster	Team	Frequency
	Quality/Process Improvement Team	6
	Interdepartmental Committee/Project Team	5
	Ergonomic/Human Factors Design Team	1
	Interdepartmental Cross-Functional Work Team	1
1	Singing/Musical Group/Ensemble	1
	Volunteer Emergency Rescue Squad/ALS Team	1
	Golf Team	1
	Volleyball Team	1
	Administrative Board	1
		18
	Quality/Process Improvement Team	1
	Lacrosse Team	1
	Fire Dept. Engine/Truck/Ladder Company	2
	Fire Dept. Inspection/Investigation Team	1
	Technical Rescue Team	2
	Interdepartmental Cross-Functional Work Team	3
2	Manufacturing/Assembly Team	1
	Remanufacturing/Reassembly Team	1
	Building Inspections Team	2
	Office Assistants Team	1
	Natural Gas Construction Crew	1
	Acting Cast/Ensemble	1
	Operations/Inspections Bureau	2
	HAZMAT Team	2
		21
	Quality/Process Improvement Team	5
	Interdepartmental Committee/Project Team	1
	Field Hockey Team	2
	Basketball Team	2
	Football Team	1
	Soccer Team	1
	Softball Team	1
	Lacrosse Team	1
	Aircraft Cockpit Crew	1
	Navy Message Center Team	1
3	Navy Combat Systems Training Team	1
	Interdepartmental Cross-Functional Training Team	1
	Emergency Dive Team	1
	Boat Team/Surf-Rescue Squad	1
	Technical Rescue Team	1
	Volunteer Emergency Rescue Squad/ALS Team	3
	Automotive Service Team	2
	Natural Gas Construction Crew	2
	FPA OSH Team (Fire Safety Team)	1
	HAZMAT Team	1
	Manufacturing/Assembly Team	1
		31

(continued)

Table 14 (continued)

Cluster	Team	Frequency
	Automotive Service Team	2
	Aircraft Cockpit Crew	1
	Soccer Team	2
	Natural Gas Construction Crew	1
	Interdepartmental Cross-Functional Work Team	1
	Fire Dept. Engine/Truck/Ladder Company	3
	Emergency Grant Program	1
4	Building Inspections Team	2
	HAZMAT Team	1
	City SWEEPS Project Team	1
	Navy Tactical Warfare Team	1
	SERT Team	1
	Volunteer Emergency Rescue Squad/ALS Team	1
	Diving Team	1
		19
	Process Management Team	1
	Ergonomic/Human Factors Design Team	1
	Building Inspections Team	1
	Manufacturing/Assembly Team	2
5	Organizational Planning Department	1
	Self-Funded Designated Service Unit	1
	Fire Battalion	1
	Cost Engineering/Cost Down Team	1
	Operations/Inspections Bureau	2
		11

ANOVA Results

To improve clarity and understanding of the significant MANOVAs, univariate analysis of variance procedures were conducted to identify the variables or factors significantly affected by team leadership type. Results showed a significant main effect of team leadership type on five of the 12 Teamness Index items, the composite Teamness Index rating (i.e., scale mean), four of the six questionnaire factors, seven of the interview questions related to leader behaviors, and two of the interview items related to team or leader characteristics (note: the five-cluster solution produced more significant univariate results than either the six- or seven-cluster solution).

Significant results related to the Teamness Index are presented in Table 15. The significant results related to the Team Leadership Questionnaire are presented in Table 16. The significant results related to the behavioral items of the interview and the descriptive items of the interview are presented in Tables 17 and 18, respectively. Finally, a series of supplementary ANOVAs was performed on the individual items comprising the questionnaire factors that were found to be significant in the initial univariate analyses. These item-level analyses provided further clarification and better understanding of the factor-level results. The results of the item-level analyses of the questionnaire data are summarized and presented in Appendix HH.

Table 15

Significant ANOVA Results for Teamness Index Variables

Source	df	SS	MS	F
Item 4				
Cluster	4	13.12	3.28	4.49 **
Error	95	69.44	0.73	
Corrected Total	99	82.56		
Item 7				
Cluster	4	7.13	1.78	4.95 **
Error	95	34.18	0.36	
Corrected Total	99	41.31		
Item 10				
Cluster	4	9.82	2.46	2.87 *
Error	95	81.22	0.85	
Corrected Total	99	91.04		
Item 11				
Cluster	4	4.80	1.20	2.99 *
Error	95	38.11	0.40	
Corrected Total	99	42.91		
Item 12				
Cluster	4	15.69	3.92	5.72 ***
Error	95	65.15	0.69	
Corrected Total	99	80.84		
Composite (Teamness Index Mean)				
Cluster	4	1.78	0.44	3.37 *
Error	95	12.53	0.13	
Corrected Total	99	14.31		

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

Table 16

Significant ANOVA Results for Questionnaire Factors

Source	df	SS	MS	F
Leader Background				
Cluster	4	12.55	3.14	4.55 **
Error	95	65.50	0.69	
Corrected Total	99	78.05		
Autonomy/Self-Direction				
Cluster	4	21.03	5.26	10.03 ***
Error	95	49.77	0.52	
Corrected Total	99	70.80		
Leader Demographics				
Cluster	4	7.37	1.84	2.62 *
Error	95	66.69	0.70	
Corrected Total	99	74.06		
Leader Power				
Cluster	4	6.92	1.73	2.60 *
Error	95	63.13	0.66	
Corrected Total	99	70.05		

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

Table 17

Significant ANOVA Results for Interview Variables Related to Leader Behaviors

Source	df	SS	MS	F
TRAINER				
Cluster	4	38.70	9.68	4.98 **
Error	95	184.69	1.94	
Corrected Total	99	223.39		
TRAINED				
Cluster	4	10.97	2.74	2.46 *
Error	95	105.78	1.11	
Corrected Total	99	116.75		
EVALUATE				
Cluster	4	28.06	7.02	8.23 ***
Error	95	80.93	0.85	
Corrected Total	99	108.99		
EVAL. FOCUS				
Cluster	4	41.03	10.26	4.77 **
Error	95	204.41	2.15	
Corrected Total	99	245.44		

(continued)

Table 17 (continued)

Source	df	SS	MS	F
TEAM RECOGNITION				
Cluster	4	20.72	5.18	3.00 *
Error	95	164.28	1.73	
Corrected Total	99	185.00		
PUNISH				
Cluster	4	63.25	15.81	6.59 ***
Error	95	227.79	2.40	
Corrected Total	99	291.04		
PUNISH WHO				
Cluster	4	60.11	15.03	3.94 **
Error	95	362.08	3.81	
Corrected Total	99	422.19		

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

Table 18

Significant ANOVA Results for Interview Variables Related to Team and Leader Characteristics

Source	df	SS	MS	F
SKILLS				
Cluster	4	3.88	0.97	2.92 *
Error	95	31.51	0.33	
Corrected Total	99	35.39		
PHYSICAL REQUIREMENTS				
Cluster	4	15.50	3.87	5.30 ***
Error	95	69.49	0.73	
Corrected Total	99	84.99		

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

Before the results of post hoc analyses are presented, the five types of team leadership comprising the selected classification system are described. This allows for a more meaningful discussion and description of the post hoc findings to be provided because results can be related to team types rather than cluster number.

Description of the Team Leadership Classification System

The five types of team leadership identified in Study 2 were labeled and defined with respect to their profiles of relevant attributes (i.e., the mean values of the six higher-order principal components used to create clusters as well as the 20 factors and subscales comprising the principal components). Specifically, Cluster 1 was labeled as "Self-Management." It is characterized by leaders who have little responsibility for team processes or outcomes. In addition, team leaders of this type provide minimal structure, process leadership, transformational leadership, guidance toward goal attainment, and boundary management. Likewise, very little importance is placed on process management skills. Interestingly, however, team members have only limited responsibility for leadership as well.

A graphical profile of the Self-Management type of team leadership is displayed in Figure 1. In particular, the figure presents the mean values of the principal components used to create the cluster (i.e., leadership type). To aid in interpreting this and all subsequent figures, descriptive labels associated with each of the principal components are first presented in Table 19.

In general, teams with the Self-Management type of leadership neither needed nor received much in the way of formal leadership. It should be noted that this Self-Management type of team leadership is highly similar to the notion of self-managing teams proposed by Hackman (1986).

Table 19

Principal Component Descriptions

Principal Component	Description
PC 1 =	Consideration (team building, tolerance of freedom/autonomy, transformational leadership, interpersonal interactions)
PC 2 =	Process Management and Leader Control
PC 3 =	Self-direction
PC 4 =	Structure/Direction; Representation
PC 5 =	Boundary Management by Leader; Member Responsibility for Leadership Functions
PC 6 =	Leader Involvement in Team Activities

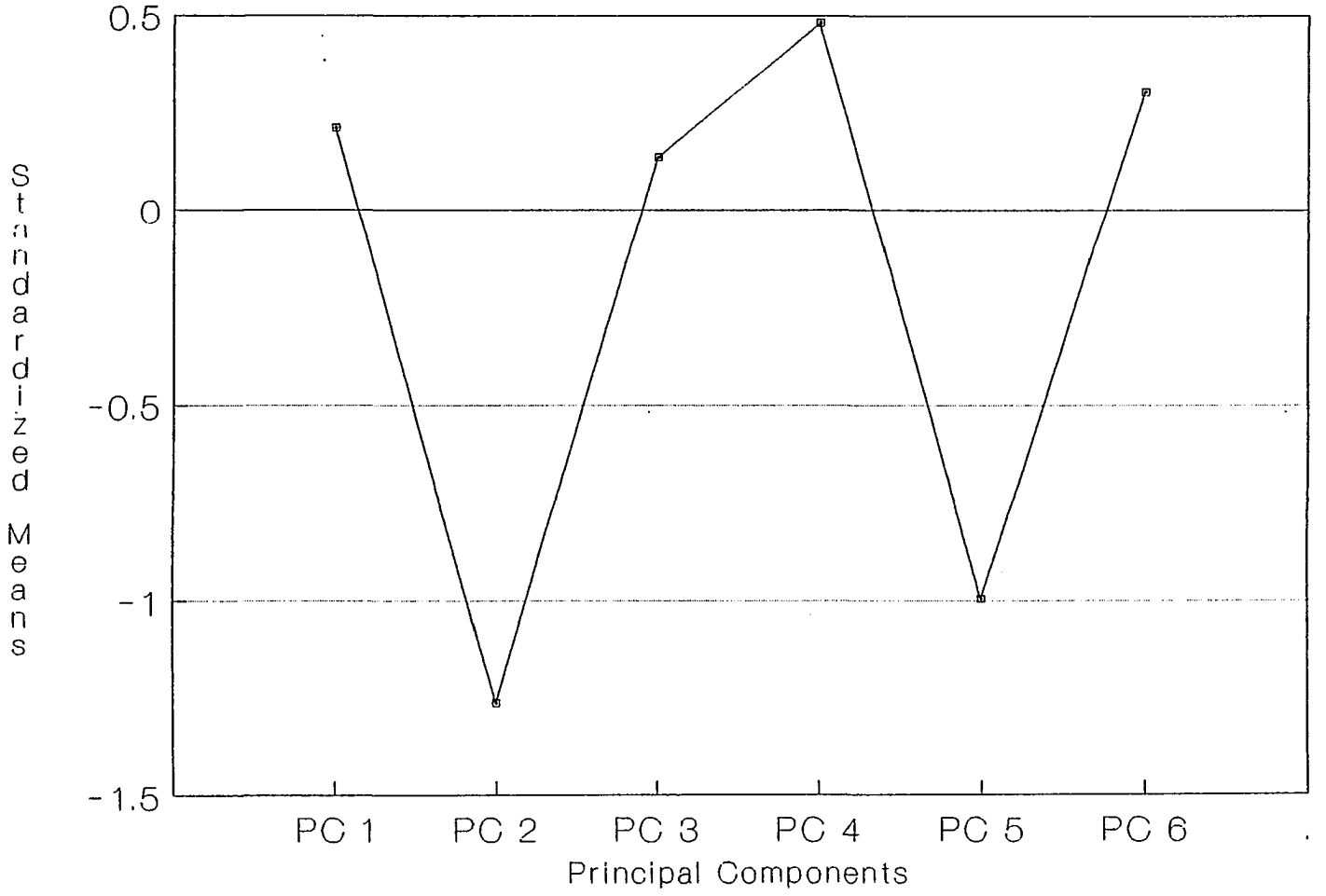

Figure 1. Profile of the Self-Management team leadership type.

In particular, Hackman described "self-managing teams" as teams where members execute the tasks and manage their own processes and performance, while others (i.e., leaders) set goals and provide supports. Examples of teams with this type of leadership include interdepartmental committees, project teams, and quality improvement teams.

Cluster 2 was labeled as "Advisory" team leadership. It is characterized by very low involvement of the leader in the actual functioning of the team, but relatively high levels of guidance toward goal attainment and openness of communication for the sharing of ideas, opinions, and concerns. In general, leaders representing this type of team leadership appear to play the role of advisor, consultant, facilitator, or coach rather than a traditional manager or director role. In turn, teams with this type of leadership include HAZMAT teams, building inspection teams, technical rescue teams, and cross-functional work teams. A graphical profile of the Advisory type of team leadership representing the mean values of the principal components is presented in Figure 2. Refer to Table 19 for descriptions of the principal components and to aid in interpretation.

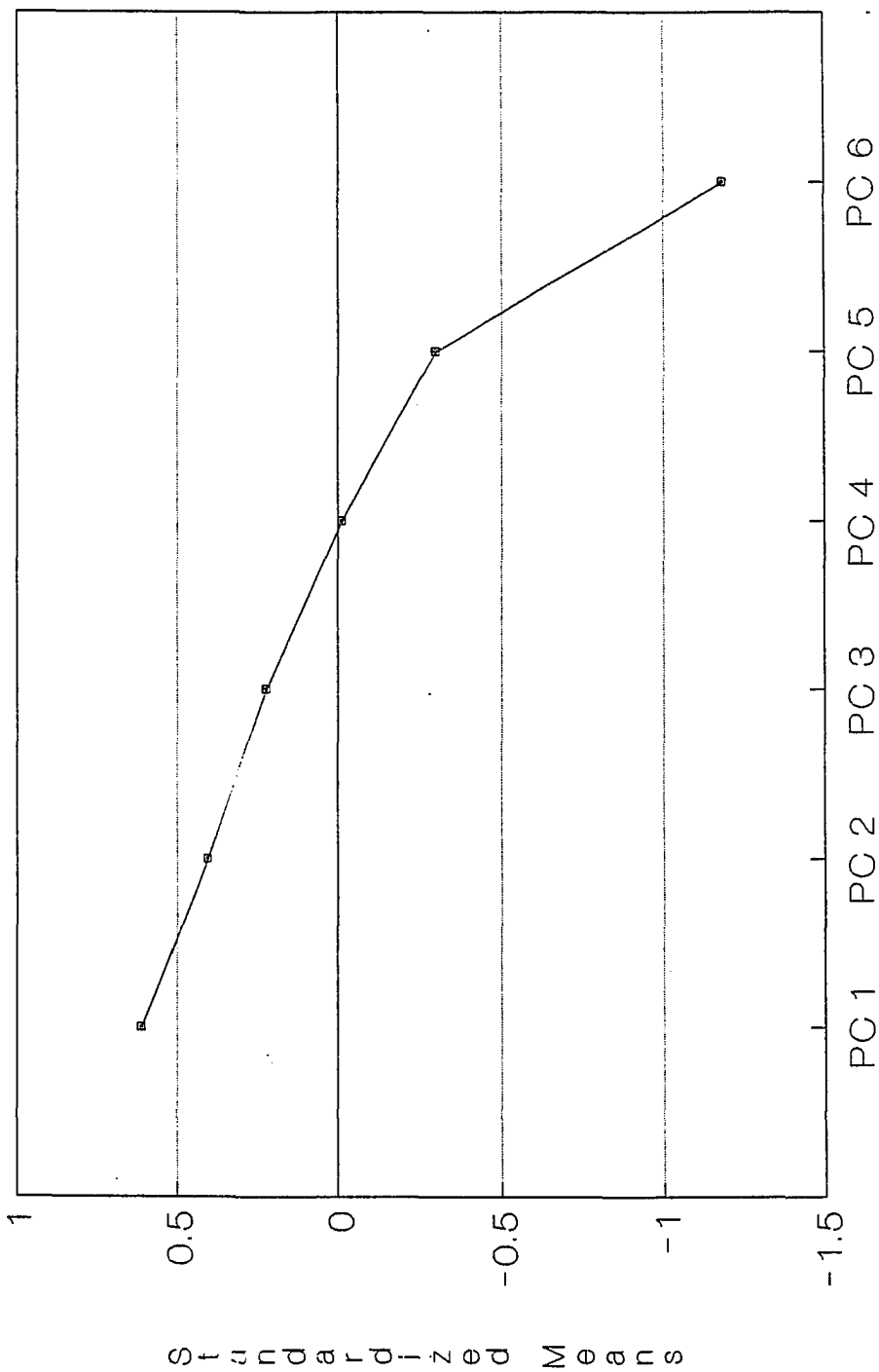

Figure 2. Profile of the Advisory team leadership type.

Cluster 3 was labeled as "Transformational" team leadership. It is characterized by high levels of: transformational leadership behaviors, team integration activities, task structure, and leader involvement in team functioning. It was also characterized by moderately high levels of boundary management and shared responsibility for leadership. Examples of teams with this type of leadership include sports teams (e.g., basketball, softball, field hockey), emergency rescue teams, and process improvement teams. A graphical profile of the Transformational team leadership type is displayed in Figure 3. If necessary, refer to Table 19 for descriptions of the principal components and to aid in interpretation.

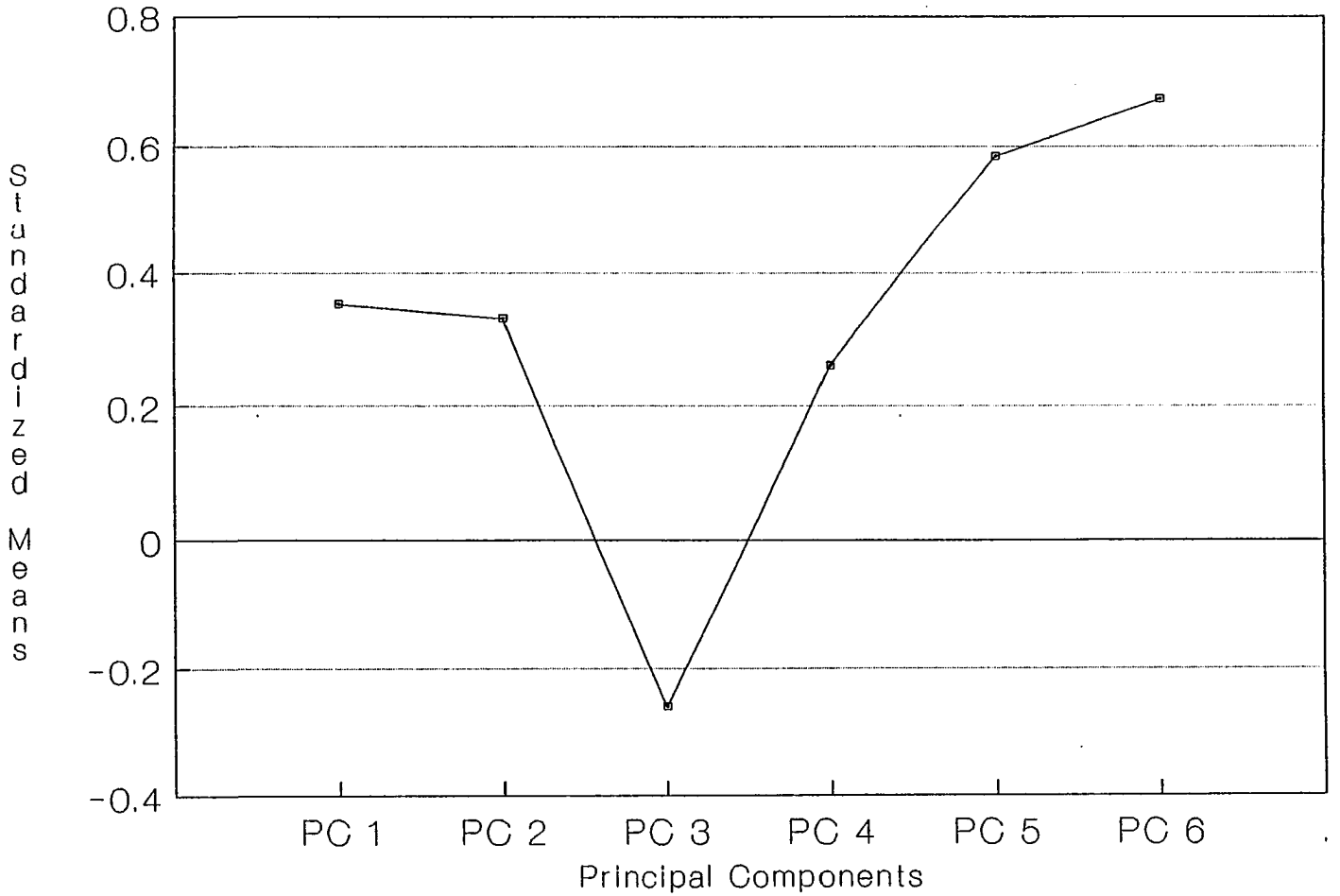

Figure 3. Profile of the Transformation team leadership type.

Cluster 4 was labeled as "By-The-Book" team leadership. It is characterized by very low levels of: consideration; tolerance of freedom or autonomy; and openness to ideas, opinions, or concerns. There were also very few transformational leadership behaviors displayed. In addition, there was very little importance placed on interpersonal or interactive leadership skills, whereas there was moderately high importance placed on process management skills. Finally, the extent to which the leader served as the representative of the team was limited in this type of team leadership. Teams with this type of leadership include fire fighting teams, Navy tactical teams, Sheriff's office emergency response teams (SERTs), cockpit crews, and ambulance crews. It should also be noted that many of the entities identified as pseudo-teams and groups display this type of leadership. A graphical profile of By-The-Book team leadership is presented in Figure 4 (see Table 19 for descriptions of the components).

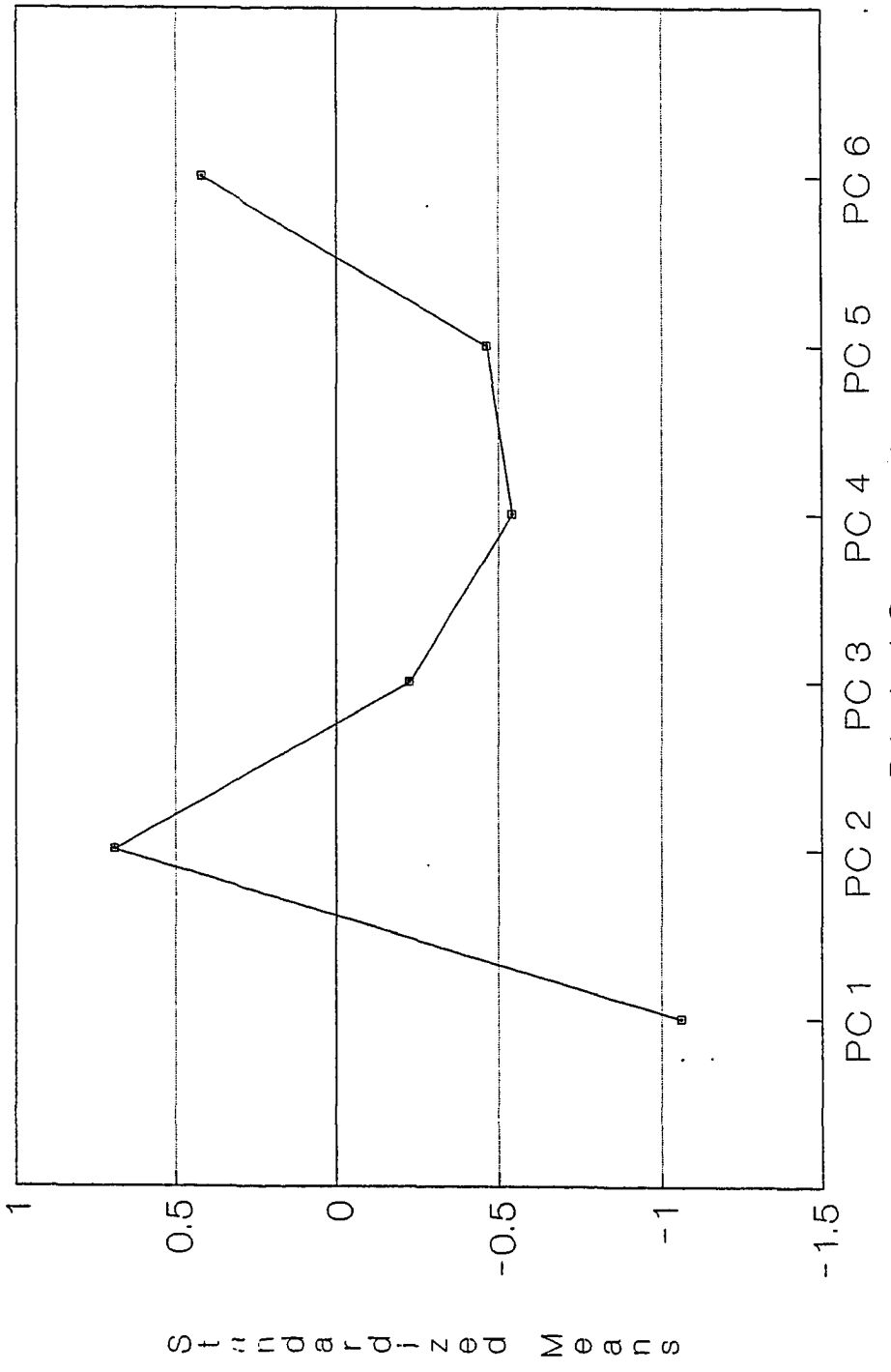

Figure 4. Profile of the By-The-Book team leadership type.

Cluster 5 was labeled as "Boundary Management" team leadership. Leaders represented by this type of team leadership are highly involved in boundary management functions; rarely assume a direct leadership role or have direct responsibility for processes or outcomes; rarely get involved in team building or team integration functions; show low levels of initiating structure and high tolerance of freedom; and place relatively little importance on process management KSAOs. Examples of teams with this type of leadership include city government agencies (i.e., operations-inspections bureau), fire battalions, an organizational planning department, and manufacturing assembly teams. A graphical profile of the Boundary Management team leadership type is displayed in Figure 5 (see Table 19 for descriptions of the components).

Finally, a graphical summary of the profiles for all five team leadership types is displayed in Figure 6, and a descriptive summary of the entire classification system is presented in Table 20.

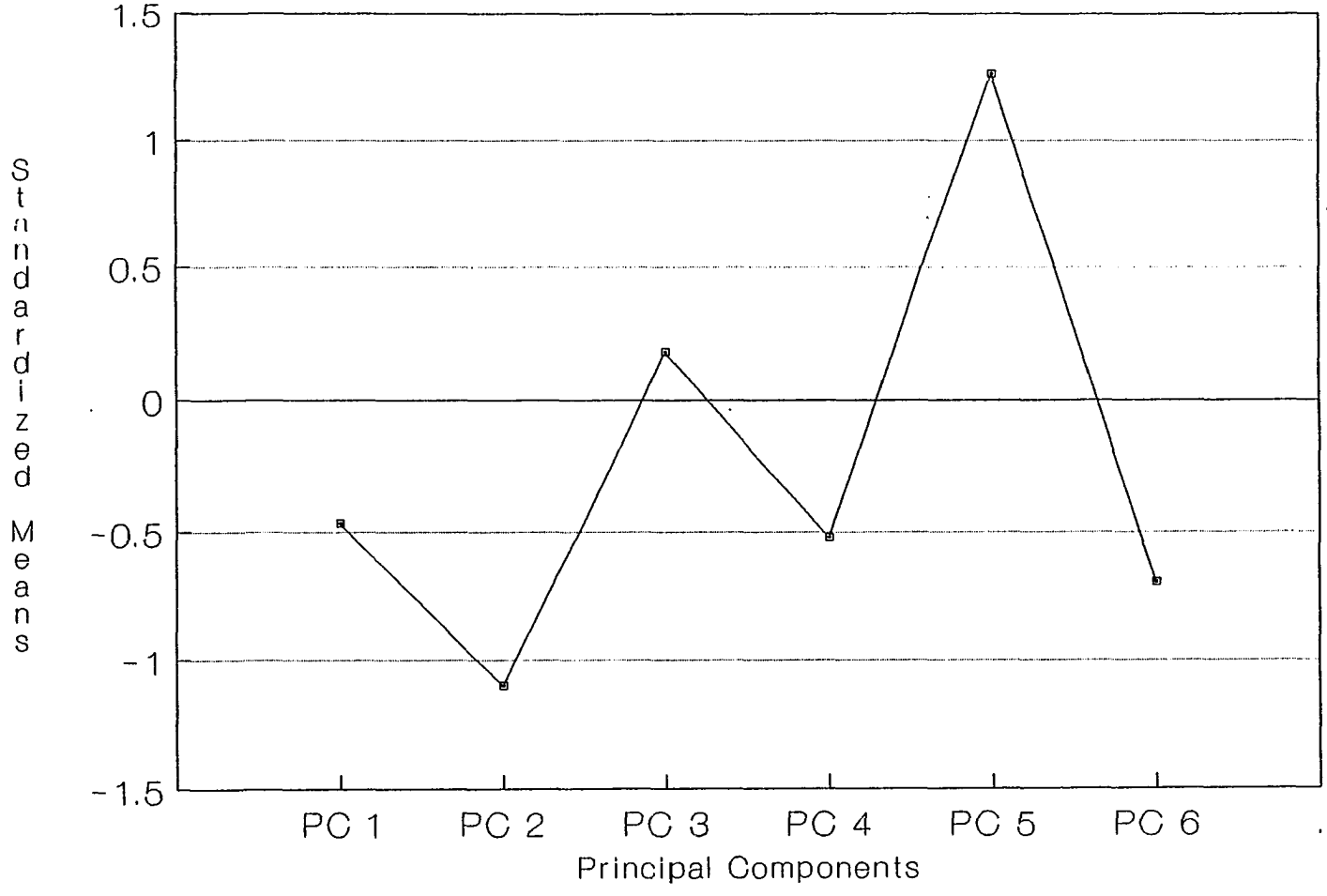

Figure 5. Profile of the Boundary Management team leadership type.

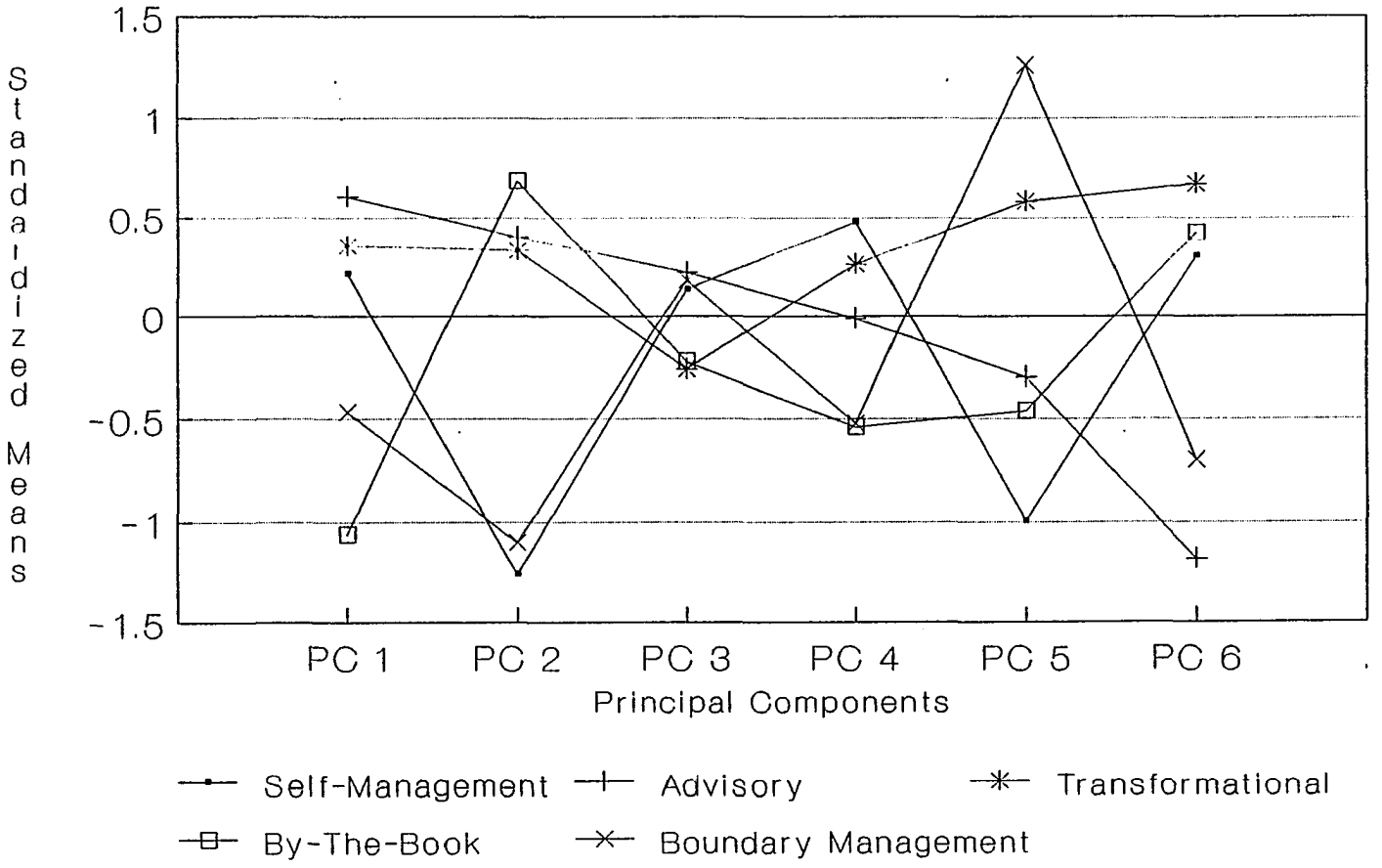

Figure 6. Combined profiles of the five team leadership types.

Table 20

Summary of Team Leadership Classification System

Cluster	Label	Profile Summary
1	Self-management	Very little process management or guidance toward goal attainment; low structure and leader responsibilities low importance of process management KSAOs; limited member responsibilities
2	Advisory	Very low involvement in team activities; high guidance toward goal attainment; open comms.
3	Transformational	High transformational leadership, integration, initiating structure, involvement with team, and shared leadership
4	By-The-Book	Very low consideration, tolerance of freedom, openness to ideas or concerns, importance of interpersonal KSAOs, representation of team, transformational ldrshp; high importance of process management KSAOs
5	Boundary Management	High boundary management behaviors and tolerance of freedom; very low leader role assumption & initiating structure; low integration, team building, & leader responsibility; low importance of process management KSAOs

Post Hoc Results

Post hoc analyses were conducted to identify where significant differences existed among the team leadership types (i.e., clusters) on each of the external variables and factors found to be significant in the ANOVAs. In particular, Tukey's studentized range test was performed on all cluster means to detect significant differences at the $p < .05$ level of significance. Post hoc results are presented below for each of the variables and factors showing a significant main effect of team leadership type.

Post hoc analyses of Teamness Index variables. Cluster 1 was found to be significantly different from Clusters 3 and 4 with respect to responses on item 4 of the Teamness Index. This indicated that self-managed teams have a significantly lower degree of role specification ($M = 3.44$) than teams with Transformational leadership ($M = 4.32$) or teams with By-The-Book leadership ($M = 4.53$).

Cluster 3 was found to be significantly different from Clusters 1 and 5 with respect to responses on item 7 of the Teamness Index. These results indicated that members of teams with Transformational leadership consider themselves part of a team to higher degree ($M = 4.74$) than members of self-managed teams ($M = 4.06$) or teams that have a Boundary Management type of leadership ($M = 4.09$).

Cluster 3 was found to be significantly different from Cluster 4 with respect to responses on item 10 of the Teamness Index. This indicated that teams with

Transformational leadership require more teamwork for goal accomplishment ($\underline{M}$ = 4.65) than teams with By-The-Book leadership ($\underline{M}$ = 3.89). In other words, teams with Transformational leadership cannot accomplish their goals without teamwork, whereas the goals of teams with By-The-Book leadership require less teamwork or may be accomplished by an individual member.

Post hoc results showed that Cluster 3 was significantly different from Cluster 4 with respect to responses on item 11 of the Teamness Index. This indicated that members of teams with Transformational leadership must interact more to accomplish the team's task or mission ($\underline{M}$ = 4.84) than members of teams with By-The-Book leadership ($\underline{M}$ = 4.26).

Cluster 4 was found to be significantly different from Clusters 1, 2, and 3 with respect to responses on item 12 of the Teamness Index. These results indicated that individual members of teams with By-The-Book leadership are significantly more likely to be able to perform all of the functions of the team ($\underline{M}$ = 3.74) than members of self-managed teams ($\underline{M}$ = 4.89), teams with Advisory leadership ($\underline{M}$ = 4.62), or teams with Transformational leadership ($\underline{M}$ = 4.65).

Finally, Cluster 3 was found to be significantly different from Cluster 5 with respect to overall level of teamness (as operationally defined in this study and assessed by the Teamness Index). This indicated that teams

with Transformational leadership possess a significantly higher degree of teamness (M = 4.57) than teams having Boundary Management leadership (M = 4.20).

A series of bar graphs representing the post hoc results related to the Teamness Index variables is presented in Appendix II.

Post hoc analyses of questionnaire factors. Cluster 3 was found to be significantly different from Clusters 1 and 2 with respect to the rated importance of the leader background variables associated with Factor 1 of the TLQ. Specifically, individuals in teams with Transformational leadership considered the leader background characteristics to be significantly more important to leadership effectiveness (M = 0.52) than individuals in self-managed teams (M = -0.33) or teams with Advisory leadership (M = -0.29). (Note that means for the questionnaire factors are presented as standard scores, with mean of 0 and standard deviation of 1).

With regard to the "Autonomy/Self-Direction" factor of the TLQ, Clusters 1 and 5 were found to be significantly different from Clusters 2, 3, and 4. These results suggested that there are significantly higher levels of autonomy and self-direction in self-managed teams (M = 0.74) and teams with Boundary Management leadership (M = 0.65) than in teams with Advisory leadership (M = -0.29), Transformational leadership (M = -0.21), or By-The-Book leadership (M = -0.42).

With respect to the importance of the leader demographic factors represented by Factor 3 of the TLQ, Clusters 5 and 2 were found to be significantly different. This suggested that leader demographic factors are significantly more important to leadership effectiveness in teams with Boundary Management leadership (M = 0.50) than in teams with Advisory leadership (M = -0.38).

Despite the ANOVA results showing a main effect of leadership type on the Leader Power factor, no significant differences between cluster means were detected through the post hoc analyses (including a follow-up Bonferonni t test). Means for the five leadership types were as follows: Self-Management (M = 0.42), Advisory (M = 0.38), Transformational (M = -0.09), By-The-Book (M = -0.22), and Boundary Management (M = -0.24). A series of bar graphs representing the significant post hoc results associated with the questionnaire factors is displayed in Appendix JJ.

Post hoc analyses of interview variables related to leader behaviors. Post hoc results showed that Cluster 1 was significantly different from Clusters 2, 3, and 4 with respect to whether the leader provides training to the team members. The leaders of self-managed teams are significantly less likely to provide training (M = 2.39) than Advisory leaders (M = 3.86), Transformational leaders (M = 4.10), or By-The-Book leaders (M = 4.05).

There was a significant difference between Cluster 1 and Cluster 2 with respect to whether the leaders had

received any training in team leadership or team performance concepts. Thus, leaders of self-managed teams are significantly less likely to have been trained ($\underline{M}$ = 2.39) than the Advisory type of team leader ($\underline{M}$ = 3.33).

Cluster 1 was found to be significantly different from Clusters 2, 3, 4, and 5 with regard to whether the leaders evaluate performance. This indicated that the leaders of self-managed teams are significantly less likely to evaluate performance ($\underline{M}$ = 3.89) than Advisory leaders ($\underline{M}$ = 4.95), Transformational leaders, ($\underline{M}$ = 4.65), By-The-Book leaders ($\underline{M}$ = 4.63), or Boundary Management leaders ($\underline{M}$ = 4.73).

Although significant post hoc differences were found among the clusters with respect to the question of whether performance evaluations were focused on the individual or the entire team, the results must be viewed with some skepticism. In particular, this variable was coded as a zero, indicating a "not applicable" (N/A) response, for any SME indicating that their team's leader(s) did not evaluate performance. The result of this was to bias clusters with several N/A responses in the direction of team-focused evaluation, which was coded as a one. Therefore, the results of the post hoc analysis for this item are not reported.

With respect to whether or not the entire team's performance is recognized and rewarded by the leader(s), post hoc results showed significant differences between Cluster 5 and Clusters 2 and 4. Thus, it appears that

Boundary Management leaders are significantly less likely to recognize and reward good performance by the entire team (M = 3.27) than the Advisory type of leaders (M = 4.67) or By-The-Book leaders (M = 4.68).

Cluster 1 was found to be significantly different from Clusters 2, 3, and 4 with respect to whether or not the leaders provide discipline or punishment for poor performance. This indicated that leaders of self-managed teams are significantly less likely to punish or discipline poor performance (M = 2.06) than Advisory leaders (M = 4.33), Transformational leaders (M = 4.00), or By-The-Book leaders (M = 4.00).

Similar to the item regarding the focus of evaluations, the significant results related to the focus of discipline or punishment (team or individual) may have been biased. In particular, this variable was coded as a zero, indicating "not applicable" (N/A), for any SME indicating that their team's leader(s) did not provide discipline or punishment for poor performance. Again, the result was to bias clusters with several N/A responses in the direction of team-focused discipline or punishment, which was coded as a one. Therefore, the results of the post hoc analysis for this item are not reported.

A series of bar graphs representing the relevant post hoc results of the interview variables related to team leader behaviors is presented in Appendix KK.

Post hoc analyses of interview variables related to team and leader characteristics. Post hoc results showed that Clusters 3 and 4 were significantly different with respect to whether teamwork skills or technical, task-related skills were more important. In particular, greater importance is placed on task-related skills in teams with By-The-Book leadership (M = 2.21), whereas greater importance is placed on teamwork skills in teams with Transformational leadership (M = 1.71).

Finally, with respect to physical requirements for leading the team, Cluster 1 was found to be significantly different from Clusters 2, 3, and 4. This indicated that leaders of self-managed teams are significantly less likely to have physical requirements (M = 1.22) than Advisory leaders (M = 2.00), Transformational leaders (M = 2.19), or By-The-Book leaders (M = 2.42).

A series of bar graphs representing the post hoc results of the interview variables related to team and leader characteristics is presented in Appendix LL.

Summary

The significant effect of team leadership type on several external (i.e., not used in the clustering process) variables and factors provided strong support for the validity and generalizability of the five-cluster solution. In turn, the results lend credence to a classification system of team leadership consisting of the five types described in Table 20.

CHAPTER VI

CONCLUSIONS

The results of the research conducted in Study 1 and Study 2 provide a wealth of information. In addition, a number of valuable lessons were learned through the research process itself, aside from the results. It is therefore the intent of this chapter to explicate the various implications, lessons learned, and contributions provided through this research, as well as provide recommendations regarding refinements and continued research.

Implications for Classification Research

Perhaps the most important outcome of this research was that it demonstrated a viable methodology for empirically developing a classification system of team leadership. This is a significant contribution given that no other classification of team leadership has been conducted. In addition, several specific lessons were learned through the research process.

The first process lesson learned was related to the value of systematic psychometric evaluation and refinement of measurement instruments to be used in collecting data for classification. In other words, there was a substantial payoff obtained in conducting Study 1 as means of developing, evaluating, and refining the measures. A comparison of the psychometric properties of the measures used in Study 1 and those used in Study 2 clearly shows the value of conducting a "pilot study" of newly developed

measurement instruments and making necessary refinements before primary data collection efforts are conducted. For example, the improved reliability and fit of the LBDQ-TL subscales and the LI Card Sort factors from Study 1 to Study 2 can be attributed in large part to the scale development and refinement procedures utilized in Study 1. Likewise, the modest reliabilities of the TLQ factors can be attributed in large part to the inability (due to significant content-based changes in Study 1) to evaluate and refine their psychometric properties prior to the primary data collection of Study 2.

Taking this lesson a bit further, it could be argued that the ideal (though impractical) approach to this research effort would have been to treat Study 2 as a follow-up to Study 1 that provides for improved refinement of the measures, and then to perform a third study for the actual classification process. Regardless, the lesson is that it is both necessary and worthwhile to perform careful psychometric evaluations of the measurement instruments used in classification efforts, especially when those instruments are created for the research.

The second specific process lesson learned and demonstrated was the value of taking an iterative approach to selecting or identifying the proper cluster solution. Although there is certainly value in utilizing stopping rules or statistics such as the cubic clustering criterion to identify the proper number of clusters, such rules and

statistics are not without problems and biases. Even the best stopping rules and statistics can result in decision errors or suggest several viable cluster solutions that require the researcher to choose the most appropriate (Milligan & Cooper, 1985). However, without the benefit of previous classification results or integrated theories to guide the researcher, as in the current exploratory effort, he or she must often rely on subjective judgment in selecting the most appropriate cluster solution.

Therefore, given the exploratory nature of this research effort, an approach that involves generating and comparing multiple cluster solutions to determine the best one for the data was not only deemed acceptable but in many ways ideal because of the objectivity provided. That is, comparing the stability of various partitions of the same data produces direct and objective results, whereas stopping rules and statistics often require some subjective judgments to be made. Thus, at least in exploratory classification efforts, an iterative approach to determining the most valid (i.e., stable, accurate, and generalizable) cluster solution is recommended as an approach for identifying the proper cluster structure.

Finally, it is interesting to note that the results of the iterative approach to cluster selection suggested that the five-cluster solution was appropriate and valid and the that highest absolute value of the cubic clustering criterion (CCC) also indicated the five-cluster solution in

both Sample A and Sample B. While this may simply be a coincidence or a possible artifact in the way in which the CCC is calculated, it provides some support for using the highest absolute CCC values to identify the number of clusters present. Additional research should be conducted (e.g., in the form of a Monte Carlo study) to evaluate the nature of this apparent relationship.

Implications for Understanding Team Leadership

The data collected in Study 2 provided a great deal of descriptive information about the general nature of team leadership and the specific characteristics of the sample. This type of information was also a significant contribution given that little in the way of empirical research has been conducted on team leadership in a diverse team sample. While the descriptive statistics presented in the Results section for Study 2 were informative in their own right, this section identifies trends in the data and provides conclusions, hypotheses, and implications designed to summarize and clarify the descriptive data.

A review of the descriptive data across all measures led to the identification of two factors that were consistently regarded as critical ingredients of effective team leadership--shared goals and communication. The findings related to these factors are summarized below.

Shared goals. Teamness Index results showed that a common and valued goal is a primary defining factor of nearly all teams. In turn, when asked for the single most

important factor distinguishing effective and ineffective leadership, the second most frequent response given was related to setting, monitoring, and ensuring the achievement of team goals. Likewise, having a shared and valued goal was the most common factor identified as a difference between leading a team and a group. In addition, many SMEs stated that having a shared and valued goal makes leading teams easier because it provides a consistent focus.

Personal commitment to the team's goal was rated as the KSAO most critical to effective team leadership. Similarly, emphasizing working toward a common goal was the third highest rated behavior on the LBT form. Finally, with respect to the TLQ question regarding sources of leadership, the highest rated source was the team's overall goal, mission, or objective, followed by a designated leader who is also a member of the team. This suggests that a shared and valued goal may even be more important in leading a team than a designated leader.

On the other hand, the fact that 100% of the teams in both Study 1 and Study 2 reported having at least one designated leader suggests that a leader is required. It also provides support for the position of both McGarvey (1991) and Parker (1991) that all teams have a designated leader. In total, these findings support the importance of both goals and leaders, and also support Larson and LaFasto's (1989) conclusion that one the most important functions of an effective team leader is to provide the team

with a clear, elevating, and worthwhile goal.

Communication. As with shared goals, results from the Teamness Index indicated that communication among members is a defining factor of nearly all teams. Likewise, communication was the most frequent response given to the interview question concerning the most important factor differentiating effective and ineffective team leadership. Furthermore, oral communication skills were rated as the third most important KSAO, and keeping members informed of relevant events was the second most common or frequently performed behavior rated on the LBDQ-TL. Finally, a review of the means associated with the LI Card Sort suggested that ensuring two-way, open communication and the opportunity to freely exchange opinions, ideas, and concerns are key activities of most team leaders.

Clearly, these findings indicate that issues and factors related to shared goals and communication are critical to team and leadership functioning. In turn, issues related to goals and communication will have implications for the selection, evaluation, and training of team leaders as well as the design of teams. Finally, the direct link between communication and goals as defining factors a team (as indicated by Teamness Index results) and the importance of the factors for effective team leadership provides support for the vital role of leadership in effective team functioning.

Despite the importance of a designated leader to the

effective functioning of a team, there was also evidence that leadership responsibility is shared or transferred on occasion. Some evidence was actually provided by an apparent contradiction in the results related to the LBDQ-TL. In particular, an item related to giving members autonomy (i.e., let the members do the work the way they think best) was rated as one of the most infrequent leadership activities; however an item related to leader control (i.e., decide what should be done and how it will be done) was also rated as one of the least frequent leadership behaviors. This suggests that the determination of how the team's work, mission, or function is carried out is actually a joint process with leader and members having equal responsibility.

Results from the LI Card Sort also provide support for the conclusion that leadership is often shared and that neither the members nor designated leaders have complete control. Results showed that on occasion or to a minor degree team members will determine their own workload, schedule, and roles. In addition, teams were regarded as moderately self-directed. Overall, the results related to shared leadership provide some support to Larson and LaFasto's (1989) conclusion and Parker's (1991) claim that shared leadership is essential for a team to be successful.

In addition to sharing leadership with members, leadership is often shared or distributed among multiple leaders. In fact, over 60% of the teams claimed to have

more than one designated leader, and although some of these teams had "co-leaders," most had leaders at different organizational levels. This suggests that hierarchical leadership structures exist in teams and team situations just as in organizations. For example, a fire fighting team (e.g., fire department engine company) may consider the lieutenant the primary team leader, but would also consider the captain and even the battalion chief as team leaders as well. The hierarchical nature of team leadership is further supported by the finding that, in teams with more than one leader, there is generally an unequal distribution of power or influence among the different leaders, with more power being held by leaders at higher organizational levels.

Just as leaders appear willing to share leadership responsibilities with members, at least on occasion, many leaders also appear to get directly involved in team functioning. For example, the majority of team leaders considered themselves or were considered active members of the team in addition to being a leader. Likewise, responses to the question regarding working environment indicated that leaders frequently interact and work directly with team members. However, the lowest rated item in the LI Card Sort was related to the extent to which the leader is considered "just another member of the team." Thus, it seems that most leaders have leadership responsibilities that distinguish them from other members, but they also are highly involved in the actual operation of the team.

That there were often physical requirements for leading a team could be attributed, in part, to the direct involvement of leaders in team functioning, or it could be attributed to the composition of this particular sample. However, it could also be hypothesized that teams are required or formed in situations requiring or involving a high degree of physical activity, and that the more physical nature of teamwork corresponds to more physical requirements for leading teams. This hypothesis could be tested by comparing the physical activity involved in various collectives (e.g., groups, teams, departments) as well as the physical requirements (i.e., whether there are any, and if so, what they are) for team and nonteam leaders across a variety of organizations and settings.

Finally, with respect to sample composition, it was interesting to find that the most common functional team type was quality improvement teams (QITs). The abundance of QITs relative to other team "types" may be unique to this sample and attributed in part to sample selection. However, it also suggests that the TQM movement is thriving, despite the decreased coverage of the topic in both the popular and academic literature.

Implications for Selection, Training, and Evaluation

In addition to the inherent value of understanding the characteristics of team leadership, the descriptive statistics provide valuable information that can be used in developing programs and procedures for selecting effective

team leaders, training effective team leadership, and evaluating team leadership. In fact, the importance of including or addressing factors related to communication and the team's goal in selection systems, training programs, and evaluation systems has already been noted. As such, the implications of other findings for these areas are presented here.

Given the large percentage of leaders involved in team training (i.e., 84% of the sample indicated at least one leader provided training), there would certainly appear to be value in determining the training skills of candidates to be selected for team leadership positions. Alternately, there may be value in developing train-the-trainer programs for leaders who are in the process of designing or joining a team. Likewise, the large percentage of leaders involved in performance evaluation (96%) suggests the need for training team leaders in strategies and methods related to monitoring, evaluating, and rating both individual and team-level performance. Continuing with this logic, training in goal setting, team building, interpersonal dynamics, and consensus decision making has apparent value for nearly all team leaders given the results of this research. In addition, there would seem to be value in considering a candidate's experience or skill in these areas when designing a leader selection system or leader evaluation system (i.e., performance appraisal).

A review of the means related to the LBT form indicated

that people-oriented, team-building behaviors are among the most important for effective leadership. For example, among the highest rated items were supporting the efforts of all members, listening to members, emphasizing working towards a common goal, motivating and inspiring members to perform, and fostering team spirit and morale. Similarly, personal commitment to the team and team members, fairness and impartiality to all members, and oral communication skills were considered among the most important knowledge, skills, abilities, and other characteristics that leaders should possess to be effective. Finally, encouraging interaction among members and keeping the members working together as a team were among the top five highest rated behaviors on the LBDQ-TL. Clearly then, interpersonal skills and behaviors are critical and must be considered in the development of selection, training, and evaluation systems of team leaders.

With respect to leader traits, personality and intelligence were two factors rated as very important to leadership effectiveness. As such, the inclusion of personality measures and intelligence tests in leader selection systems seems worthwhile and warranted.

A somewhat surprising finding was the relative lack of importance placed on previous team or leadership experience or task expertise for being an effective leader. These data suggest that with the right set of general skills an individual may be able to be an effective team leader with little or no previous experience or technical expertise.

Although experience or task-related skills should by no means be considered irrelevant or unimportant, these findings do have implications for the design of selection systems. Specifically, the findings suggest that experience and technical expertise should not be weighed as heavily as typically done in selection, or at least not as heavily as factors rated as more important--such as interpersonal skills or intelligence.

The descriptive statistics discussed thus far have provided information about the general nature of team leadership as well as provided a basis for improvements or advancements in the selection, training, and evaluation of team leaders. However, even greater advancements can be made in these areas as a result of the team leadership classification system developed through this research. As such, the discussion will now turn to the classification system and its various implications.

Implications of the Classification Results

At the most fundamental level, the classification system of team leadership developed in this research has implications for how team leadership is conceptualized, researched, and understood. Most significantly, the classification system provides the first empirical support for the existence of distinct types of team leadership. In turn, it supports Kolb (1992), Komaki et al. (1989), and Schlesinger's (cited in Lawler, 1991) belief that distinct types of team leadership exist.

Benefits of the Team Leadership Classification System

In addition to the value of knowing the team leadership types that exist, the results of the classification effort can be tied directly to the general and applied benefits associated with classification systems (see pages 45-47).

First, the team leadership classification system provides for improved organization, understanding, and communication of information related to team leadership. For example, the labels and profiles associated with the five types of team leadership identified in this research provide a foundation from which to discuss, study, and understand the phenomenon.

Second, the classification system specifies the range of permissible generalizations that may be made. In turn, knowing the range of permissible generalizations allows for more precise, accurate, and effective recommendations to be made. For instance, the system could be used to determine the generalizability of the conclusions reached and recommendations provided in conjunction with the descriptive statistics. It may be found that the importance of a certain factor for the effectiveness of one type of team leadership does not apply or generalize to other types. For example, while the sample statistics indicated that experience is generally of little importance for effective team leadership, an examination across leadership types shows that experience is rather important for being an effective Transformational leader.

Third, the classification system provides a basis for hypothesis generation and theory development. Clearly, there are many questions that arise and suppositions that can be provided with respect to the five types of team leadership identified. In addition, with further research a theory of team leadership could eventually be developed.

Fourth and finally, the system can be used to identify knowledge gaps in the field of team research. In particular, the results of this classification effort can be used to determine where our knowledge is limited and where additional research is needed most.

The impact of the classification system on the first two factors (i.e., understanding and generalizability) has already been addressed in the Results section of Study 2 whereby the leadership types were defined and the results of the post hoc analyses were explained. Therefore, the key knowledge gaps are identified next and recommendations for additional research are provided. In addition, relevant hypotheses are included as appropriate.

Identifying and Bridging the Knowledge Gap

The most important knowledge gap identified by the development of this team leadership classification system is that little is known about the relationship between leadership and teams. While the classification system of team leadership represents a significant advancement in our understanding of team leadership, we still do not know the teams, situations, or contexts to which the information

about team leadership may be generalized. In essence, we now have information on how to select, train, and evaluate different types of team leaders, but we do not know in what type of team or under what circumstances one type of leadership should be utilized over another. As such, the functional utility of the system is currently limited. In turn, the crucial next step in the research process should be to identify the various contextual factors associated with each type of team leadership so that specific predictions and applied recommendations may be made.

The results of the current research provide some insights into the relationship between team leadership types and factors related to the team or team context. For example, the results of the analysis of variance procedures and post hoc tests suggested that the Transformational type of team leadership is associated with teams showing a high degree of teamness (e.g., high interdependence, cohesiveness) such as sports teams and emergency rescue squads. Other post hoc results suggest that teams with high physical activity or many physical requirements are unlikely to have a Self-Management type of leadership. In addition, By-The-Book leadership is common in teams where technical skills are critical to team effectiveness (e.g., Navy tactical teams, fire fighting teams), whereas Transformational leadership is common in teams where teamwork skills are most critical (e.g., QITs, sports teams). Finally, a review of some of the nearly significant

results (i.e., $p < .10$) suggested that type of team leadership may also vary by team size. In particular, it seems that Boundary Management is most often found in large teams (e.g., fire battalions, planning departments, government bureaus), whereas smaller teams are more likely to utilize Self-Management or By-The-Book leadership (e.g., cockpit crews, musical groups).

Certain relationships between team leadership types and team factors can also be derived from a review of the leadership profiles and the teams comprising the leadership clusters. For example, it appears (or can be hypothesized) that the Self-Management type of leadership is associated with teams that are highly trained and developed, teams with highly standardized or consistent operating procedures, or teams that are so structured and proficient that the leader is essentially a figure head position. Alternately, it could be suggested that Self-Management is found in teams with few rules, guidelines, or constraints such that focused leadership is largely unnecessary, and if a leader emerges, he or she is an informal, internal leader.

It appears that Advisory leadership is associated with teams consisting of members with high levels of technical expertise and whose primary function may include an important mental or cognitive component (e.g., HAZMAT teams, cross-functional work teams, building inspection teams). Thus, these teams have leaders who serve primarily as resources to help overcome problems, or as facilitators and

catalysts who help the team overcome hurdles to goal achievement.

The review also suggests that Transformational team leadership is associated with teams requiring a high degree of teamwork and leader involvement for success, such as sports teams. On the other hand, it seems that By-The-Book team leadership is associated with teams where rules and standardized procedures are critical to success, such as fire fighting teams, combat teams, cockpit crews, and inspection teams.

Finally, Boundary Management team leadership appears to be most common in large teams with relatively low levels of teamness, or when leading multiple teams. Groups or teams utilizing this type of leadership would be found in assembly lines, organizational departments, government bureaus, and fire battalions. Typically, it seems that Boundary Management is associated with leaders at high organizational levels who focus on the "big picture" and are somewhat removed from actual team activities and day-to-day operations.

Clearly, the current research has provided some useful and informative data regarding the relationship between team leadership types and certain team and situational factors. However, the findings are limited and many of the conclusions are hypothetical rather than empirical. Therefore, research should be conducted to assess the link between team leadership types and team types.

It is recommended that efforts first be made to match the types of team leadership identified in this study with the types of teams identified or proposed in other classification efforts. For example, Yanushefski (1995) recently conducted an empirical classification effort aimed at identifying team types; a comparison of those team types with the types of team leadership identified here would have profound implications for the recommendations and generalizations that could be made regarding team leadership. However, while valuable and informative, knowing the type of team leadership typically associated with a particular team type does not address the issue of equifinality. That is, it does not answer the question of whether or not that type of leadership is required for the team to be effective, or if a particular type of team could be equally effective with different types of leadership. Therefore, additional research should be carried out to determine the impact of leadership type on team effectiveness. Ideally, an experimental design would be utilized in which leadership type is manipulated in a sample of teams representing the various team types. However, a more practical alternative would be to develop and conduct a survey of teams that assessed or determined: (a) the type of team represented, (b) the type of team leadership utilized, (c) the effectiveness of the team, and (d) the effectiveness of the leadership. These results could then be analyzed to determine the impact of certain combinations

of team type and team leadership type on team and leader effectiveness.

Once the relationship between team leadership and team type is explicated, the classification system of team leadership developed in the current research could provide a foundation for much more precise, accurate, and applied recommendations regarding the evaluation and training of team leadership and the selection of team leaders. This assumes, however, that the results of the recommended research would fail to support the notion of equifinality. That is, it assumes that the results would indicate that certain types of leadership are more appropriate and effective in a given type of team than other types of leadership. As previously indicated, there is some support for this assumption already provided by the results of the current research effort. For example, it could be reasonably hypothesized that Transformational team leadership is not only associated with highly integrated and interdependent teams, but that the Transformational type of leadership is also required for maximum effectiveness in such teams (i.e., effectiveness in such teams will decrease with other types of leadership). Therefore, the assumption is made that a particular team type will be most effective with a particular leadership type, and this assumption is carried through in the subsequent recommendations and conclusions.

One important impact of a contingent relationship

between leadership type and team type would be to improve the validity and accuracy of leader selection systems. For example, knowing the type of leadership most appropriate for a particular team would allow a leader selection system to be developed that included criteria critical to the effectiveness of that type of leader. Thus, the criteria would be obtained from the profile of the appropriate leadership type as defined in the team leadership classification system. The value and importance of effective leader selection techniques was indicated by the finding from the current research that leadership stability is critical to leadership effectiveness. Thus, effective selection is needed to minimize turnover in team leaders which could have a profound and negative impact on leader and team effectiveness.

Identifying the contingencies between leadership type and team type would also provide the basis for significant improvements in team leader training. The primary problem with current training programs is a lack of specificity or detail. For example, results of the current research showed that while the majority (81%) of leaders had received some form of training related to team leadership or team performance concepts, nearly 60% of these leaders received only generic team leadership training or training unrelated to their particular team or situation. These findings also coincide with Hallam and Campbell's (1994) conclusion that teams typically receive generic training related to building

relationships, setting goals, and clarifying member roles. However, as they further noted, there needs to be a move from such across-the-board training to more specific, situationally contingent approaches. This could easily be addressed once the appropriate contingencies are identified through the recommended research. That is, once the relationships between team type and leadership type are determined, recommendations could be made for the design of more situationally-specific leader training programs. Alternately, the generalizability of a particular training program from one context to another could be determined.

The criteria with which to evaluate the effectiveness of a given team's leadership could also be identified once the link between leadership and team type is determined. In fact, knowing the types of team leadership that exist and the link between leadership type and team type would allow managers to predict the relative effectiveness of leaders in one team as they move to another. Furthermore, understanding the different types of team leadership and the attributes that are indicative of effectiveness in each type would allow for improved validity and accuracy of leadership appraisal systems. Finally, once the contingencies are determined, assessing the match between team type and leadership type could provide a simple means of identifying the cause of team and leadership performance problems (i.e., a mismatch of types).

Implications for the Design of Effective Teams

Finding that a certain type of team requires a certain type of team leadership to be effective would allow the conclusion to be made that team leadership is critical to effective team performance. In turn, ensuring effective team leadership by means of selection or training would be a critical ingredient in designing an effective overall team. Thus, training or selecting for effective team leadership would be a necessary but not sufficient factor in the creation or design of effective teams. This notion is actually supported by Pratt and Jiambalvo (1981) who found a relationship between leadership behavior and effective audit team performance and suggested that leaders be trained to perform those behaviors associated with team effectiveness.

Additional Research

While the research recommendations provided thus far would greatly help to bridge what was identified as the critical knowledge gap in the area of team leadership, additional research is needed to addresses other relevant issues and questions.

Replication, Revisions, and Refinements

It is recommended that Study 2 be replicated with a different, larger sample to determine if the same five types of leadership would be identified. Replication of the results (i.e., five similar types of team leadership are identified) would provide very strong evidence for the existence of five types of team leadership and would further

support the methodology. If the results were not replicated, the information obtained would provide valuable insights with respect to team leadership and further understanding of team leadership types. For example, it might be found that more than five types of team leadership are identified in a larger sample, suggesting that a certain type of leadership may have been underrepresented in the current effort.

Although exact replication of the procedures utilized in the current classification effort would allow direct comparisons and conclusions to be drawn, certain revisions would also be valuable and beneficial. In particular, further evaluation and refinement of the dependent measures (i.e., Teamness Index, Team Leadership Questionnaire, and Team Leadership Interview) is highly recommended. First, efforts should be made to improve the reliability of Teamness Index or determine if it is a multidimensional scale and, if so, build up the subscales as necessary to adequately assess the dimensions. Likewise, efforts should be made to improve the reliability and fit of the factors associated with the Team Leadership Questionnaire. It is quite possible that with refinement of the factors, additional effects will found to be significant in the analysis of variance procedures and post hoc tests. Finally, the most reasonable factor structure should be extracted from the Team Leadership Interview, and weak factors should be built up with additional related items.

In general, such refinement of the dependent measures may produce more significant results in the external validation phase, but would certainly increase confidence in and interpretability of the results.

Just as there would be value in refining the dependent measures, it would also be worthwhile to further refine the measures used in the clustering process. Although the psychometric properties of the LBT form, KSAO Card Sort, LBDQ-TL, and LI Card Sort were generally quite sound, each of the measures could be improved with the addition of relevant items to boost reliability, the elimination or revision of certain weak items, and careful attention to modification indices provided through LISREL analyses. As with the dependent measures, the refinement of the measures used in the clustering process may impact the results obtained, but would certainly increase confidence in and interpretability of the results.

With respect to actual data collection procedures, it would be extremely valuable to collect data from more than one representative of the team. In other words, multiple members and leaders from the same team should be interviewed and asked to complete the various measures. This procedure, though difficult and perhaps impractical, could provide a wealth of important information. First, it would provide for an evaluation of interrater reliability and therefore a better understanding of the measurement properties of the instruments. Second, it would provide a means of

identifying and assessing the impact of factors such as: differences in the perspectives of leaders and members, attribution biases of the leaders and members, personal biases of all participants, and proclivity for rating errors such as leniency or inflation. For example, it might found (and hypothesized) that the way in which leaders assess the basis of their power and influence is distinctly different from the way in which members assess the leaders' power (e.g., members may be more likely to state that a leader has or uses coercive power). Third, combining the information from multiple sources would provide for greatly improved accuracy of and confidence in the information. This would be true whether averages, majority responses, or consensus were used to arrive at the final assessment of a given team's leadership. Finally, conducting joint interviews or requiring consensus on disparate ratings could actually provide an important learning and feedback opportunity to the participants (as well as the researcher).

Unanswered Questions

There are also important questions about team leadership that remain to be answered (many of which are similar to the questions still plaguing the general leadership field). For example, research is needed to determine how ingrained these team leadership types are in the individual (e.g., do the types represent stable, innate traits or learned behaviors). Likewise, research is needed to determine whether or not individuals can effectively

switch from one type of leadership to another as the situation demands. Related to these questions, is the question of whether it is more appropriate to match the leader to the team or the team to the leader. It is also unclear if or when it is more appropriate to select a leader that fits the required or recommended leadership profile rather than create a leader of the required type through training. Finally, it would be extremely valuable to know how the findings of other team leadership research studies (i.e., those displayed in Table 2) may be generalized. Once the recommended research regarding the link between team leadership types and team types or team situations is conducted, these and other relevant questions should certainly be researched.

The Challenges of Team Leadership Research

As a result of the current classification effort, a number of lessons were learned regarding the complexities and challenges associated with research on team leadership. In turn, these lessons are described here and should be considered in any future research studies of the team leadership phenomenon.

One of the biggest difficulties in conducting this research was related to the complexity of the team leadership phenomenon. For example, the research indicated that teams may obtain leadership from multiple leaders, at different organizational levels, with varying levels of responsibility, power, and involvement in the team. In

addition, teams often obtained leadership from sources other than designated leaders (e.g., goals, other team members). Furthermore, the way in which a team's leadership is conceptualized can and did vary by the perceptions of the SME. Thus, despite objective reality, the SME's perceptions also defined the nature of the team's leadership. For example, the leader of one team in a multi-team organization stated that her team had only one leader (i.e., herself), whereas the leader of another of the teams indicated that her team had two leaders (i.e., herself and her boss, the "Coach"). Clearly, these issues show the complexities and difficulties in just trying to define the phenomenon.

Other difficulties arise with respect to the measurement of the phenomenon. First, precision in measurement is difficult because there is a great deal of variability possible in any given leadership situation due to the fact that leadership is a largely individualized phenomenon. That is, two leaders in identical situations are likely to vary in certain aspects of their leadership due simply to their unique personalities, styles, perspectives, abilities, etc. As such, there will always be a moderate degree of variability within leadership types as well as between. Such variability certainly makes the identification of distinct team leadership types more challenging and even questionable. However, it is likely, that the variability among individual leaders may be limited by situational constraints, thereby allowing for both

distinct types (i.e., as dictated by team type or situation) and variability within types (i.e., due to individual differences and flexibility within certain parameters).

Second, the large mental or cognitive component of leadership prevents thorough and accurate assessment of the phenomenon through observational means. Therefore, subject matter experts are required. On the one hand, using leaders as subject matter experts may provide the most thorough and arguably accurate information regarding leadership (e.g., who knows more about leadership than the leader). On the other hand, this amounts to self-evaluation which can be impacted by attribution biases, inflated ratings, reluctance to provide negative information, etc. One alternative is to use members as subject matter experts. However, it is likely that members will be less knowledgeable about leadership in addition to having their own biases. Thus, the ideal approach would be to use multiple subject matter experts from the same team. However, as noted previously, this could become functionally impractical due to time, costs, scheduling, etc. Ultimately, the choice must lie with the researcher, and the problems or weaknesses associated with the approach must be recognized and minimized.

Finally, the exploratory nature of the current team leadership research was especially challenging because there were no existing measures of team leadership with which to assess the phenomenon nor theory of team leadership to guide

the process. The measures developed and utilized in the current research effort should prove useful in future research studies. Likewise, the current study should provide a basis for the eventual development of a theory of team leadership that could be used to integrate existing research and guide future research. In sum, the current research effort has provided a foundation from which further significant advancements can be made in the areas of teamwork and team leadership.

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APPENDIX A

Teamness Index:

Study 1

Teamness Index

Directions: Please rate each of the following statements according to the following five-point scale by writing the appropriate number in the blank to the left of the statement.

1	2	3	4	5
Strongly Disagree	Disagree	Unsure	Agree	Strongly Agree

_____ 1. Team members cannot complete their tasks without information, materials, or assistance from other members on the team.

_____ 2. Team members share a common and valued goal, mission, or objective.

_____ 3. Team members must coordinate or time their activities in order to work together and achieve the team's goal, mission, or objective.

_____ 4. Each team member has a specific role or function on the team.

_____ 5. Individual goals are directly related to the goals of the team.

_____ 6. Team members depend on each other to accomplish their tasks.

_____ 7. Members consider themselves part of a team.

_____ 8. Team members must communicate with each other in order to accomplish the team's goal, mission, or objective.

APPENDIX B

Preliminary Questions:

Used to Select Appropriate Version of Interview and Questionnaire in Study 1

Preliminary Questions

1. What teams are you currently associated with or involved in?

p
r
e
s
e
n
t

2. What teams have you been associated with in the past?

p
a
s
t

*Choose one and ask if he or she is **familiar with the leadership practices on that team;** choose until he/she answers yes. CIRCLE THE TEAM SELECTED.*

3. Does/Did the team have an identifiable leader?

____ yes ____ no (STOP, use the NO LEADER Version)

4. Are you or were you the leader of the team?

____ yes (USE LEADER VERSION)

____ no (USE MEMBER VERSION)

5. Does/Did your team have more than one leader? In other words, is/was there someone else inside or outside the team that plays a leadership role for the team either formally or informally?

____ yes (USE MULTI-LEADER VERSION)

____ no (USE SINGLE-LEADER VERSION)

APPENDIX C

Team Leadership Interview:

Study 1

Present/Multi-Leader/Leader Version

NATURE OF LEADERSHIP

I'll be asking you a number of questions concerning team leadership. Unless I specify differently, please consider the specific team with which you are associated when responding to the questions. Okay? Do you have any questions before we begin?

1. In addition to being the team leader, are you also a member of the team?

   yes ____ no ____

2. Are you the leader of more than one team? If so, how many teams do you lead?

   a) yes ____ no ____ b) How many ____

3. You indicated that your team has more than one leader, how many leaders does the team have?

   _____

   describe each (position, role, etc.)

   Leader 1 Leader 2 Leader 3

4. Tell me about this team's leadership. How is the team led, organized, and managed?

5. Do the leaders have an equal amount of power or influence over the team?
   yes ____ no ____

   a) Who has the most power? _____

   b) Who has the least? _____

6. How many members make up the team? _____

7. Does everyone in the team consider you the leader?

   yes ____ no ____

   a) If not, why?

   ____ I only consider myself the leader because I do more than anyone else to lead, guide, direct the team

   ____ I'm an informal leader rather than an appointed leader in a leadership position

   ____ It is a figurehead position with no real power or authority

   ____ Because there is more than one leader, I may not be considered **the** leader by everyone in the team

   ____ Because we share leadership, no one is considered the leader

   ____ Other

8. Were you, or any of the other leaders, a member of the team before becoming the leader or has your entire association with the team been as the leader?

Leader 1	Leader 2	Leader 3
yes no	yes no	yes no
how long ____	how long ____	how long ____

9. How much experience have you and the other leaders had with teams of this type? In other words, how many years or months have you been associated with teams of this type?

   Leader 1 _____ Leader 2 _____ Leader 3 _____

10. How much experience have you and the others had with **leading** teams of this type?

Leader 1 _____ Leader 2 _____ Leader 3 _____

11. Is there frequent turnover of the team's leadership? In other words, has the team had several different leaders?

____ yes ____ no

How frequent; how many times has leadership changed since the team was formed? _____

Why?

12. What problems would occur or have occurred when leadership changes?

13. In what type of environment does the team operate?

____ office, conference room

____ production line

____ in front of an audience

____ out in the public

____ athletic field or sports arena

____ indoors

____ outdoors

____ dangerous, life threatening environment

____ varies

____ in a vehicle (ship, plane, tank)

____ other

14. In what type of environment do the team leaders operate?

____ same environment as the team

____ sometimes with the team, sometimes away from team

____ away from the team in ____ a separate office

____ a remote area in the same general environment

____ other

Do the different leaders operate in different environments?

____ yes ____ no If yes, explain the differences.

15. How does one become the leader of this type of team?

____ appointed by a superior

____ selected as in any other job

____ nominated by the team

____ nominated by individuals outside the team

____ self-appointed

____ elected by the team

____ elected by outsiders

____ based on experience

____ based on expertise

____ by passing a test, getting licensed, getting certified

____ by asking for it

____ promoted from member to leader for good perf.

____ other

a) Does the process differ for the different leaders?

____ yes ____ no If yes, how so?

16. With respect to leadership, is more time spent structuring the team's tasks and activities or managing the interaction among the members?

____ structuring tasks

____ managing interactions

____ equal

a) Does it differ for the different leaders?

____ yes ____ no If yes, how so?

Leader 1

Leader 2

Leader 3

17. What factors distinguish between effective and ineffective leadership in this type of team?

18. What does it take to be an effective team leader? Describe the qualities and behaviors of an effective leader of this type of team.

19. How do the team members feel about the team's leadership? Have you heard any positive or negative feedback about how the team is led? If so, what was said?

20. Do you and the other leaders make a conscious effort to build a high level of trust among members? If so, how; what do you do?

SHARED LEADERSHIP

21. Are members **willing** to assume control of the team if you are unable to?

____ yes ____ no ____ unsure

22. Are members **able** to assume control of the team if you are unable to?

____ yes ____ no ____ unsure

23. When is it appropriate for a team member to assume the role of the team leader?

____ never

____ whenever the team leader is absent or unavailable

____ when a team issue arises in the member's area of expertise

____ when designated or assigned by the team leader

____ when designated or assigned by someone outside the team at a higher level (e.g., the team leader's superior)

____ for special projects

____ whenever they want

____ other

PHYSICAL vs. COGNITIVE REQUIREMENTS

24. What are the physical requirements for **leading** this team?

____ there are none

____ ability to lift up to ____ lbs.

____ maintain weight of ____ lbs. to ____ lbs.

____ minimum height of ____

____ upper body strength

____ lower body strength

____ 20/20 vision

____ endurance

____ flexibility

____ pass regular physicals

____ good hand-eye coordination

____ good hearing

____ bending, stooping, twisting

____ ability to walk long distances or long durations

____ ability to run _____ in under _____

____ specialized physical talent or ability

____ other

a) Does it differ for the different leaders?

____ yes ____ no If yes, how so?

Leader 1

Leader 2

Leader 3

25. Do you and the other leaders spend more time on mental activities or physical activities? In other words, does leading this team involve more thinking or more doing?

____ mental ____ physical ____ equal

a) Does it differ for the different leaders?

____ yes ____ no If yes, how so?

Leader 1

Leader 2

Leader 3

26. Does an effective leader of this type of team have to be able to think abstractly?

____ yes ____ no If yes, how so?

a) Does it differ for the different leaders?

____ yes ____ no If yes, how so?

Leader 1

Leader 2

Leader 3

27. Do you and the other team leaders need to make more quick decisions or decisions requiring deep thought and careful reasoning and deliberation?

____ quick ____ deep thought ____ equal

a) Does it differ for the different leaders?

____ yes ____ no If yes, how so?

Leader 1

Leader 2

Leader 3

28. Do you and the other leaders focus more on daily planning or long-term planning?

____ daily ____ long-term ____ equal

a) Does it differ for the different leaders?

____ yes ____ no If yes, how so?

Leader 1

Leader 2

Leader 3

29. Is being an effective team leader a mentally challenging task? If yes, how so? If not, why not?

____ yes ____ no

30. Are most of the problems you and the other leaders deal with relatively complex or relatively simple and straightforward?

____ complex ____ simple ____ equal

a) Does it differ for the different leaders?

____ yes ____ no If yes, how so?

Leader 1

Leader 2

Leader 3

31. What are the educational requirements for leading this team?

____ there are none

____ high school diploma

____ two year associates or technical degree

____ specialized training or education related to the team's task

____ specialized certificate or license

____ four year college degree (B.A., B.S.)

____ master's degree

____ doctoral degree -- Ph.D.

____ other

a) Does it differ for the different leaders?

____ yes ____ no If yes, how so?

Leader 1

Leader 2

Leader 3

LEADERSHIP STYLE

32. What would be the ideal leadership style for leading a team of this type? What type or style of leadership is best for this type of team? Why?

____ directive ____ autocratic

____ participative ____ democratic

____ task-oriented ____ structured

____ people-oriented ____ considerate

____ hands-on ____ process-oriented

____ hands-off ____ outcome-oriented

____ friendly & approachable ____ other

POWER AND INFLUENCE

33. How are decisions made regarding team-related matters?

____ decisions are made independently by the leader

____ leader discusses issue with team then makes decision

____ leader solicits inputs from team and selects decision he or she feels is best

____ decisions are made based on majority vote

____ decisions are reached through consensus

____ decisions are handed down from outside the team

____ decisions are left entirely up to the team members

____ other

34. How much power do you have over the team; what degree of control do you have?

TRAINING

35. Is the training and instruction given to members relatively detailed and specific or relatively general?

____ specific ____ general ____ equal

36. Are members trained on the details of the entire team's operation and cross trained to familiarize them with the tasks performed by each member, or are members only trained to do their own tasks or functions?

____ cross-trained

____ individual function training only

Please explain the nature of the cross-training provided

37. Do you provide specific teamwork skills training to members? In other words, do you train members on how to work as a team or do you focus primarily on training each member to perform his or her own tasks or functions?

____ yes ____ no Please explain the nature of the team training you provide.

38. Have you received any training in team performance concepts or team leadership?

____ yes ____ no If yes, what was the nature of the training?

TIMING OF LEADERSHIP

39. Is leadership more important during certain activities or at certain stages of team development?

____ yes ____no

a) If yes, when is leadership most important?

Is leadership more or less important at the early stages of team development?

Is leadership more important before, during, or after the team engages in its primary task or activity?

40. How important is the timing of leadership activities? Will the timing of activities or interventions affect the team's effectiveness?

COMMUNICATION

41. Do you manage or control the communication among team members?

____ yes ____ no If so, how?

a) Does it differ for the different leaders?

____ yes ____ no If yes, how so?

Leader 2

Leader 3

42. What means of communication do you most frequently use to communicate with team members?

____ face-to-face, one-on-one

____ telephone

____ computer/e-mail

____ radio, walkie-talkie, intercom

____ memo, letter

____ team meeting

____ other

a) Does it differ for the different leaders?

____ yes ____ no If yes, how so?

Leader 2

Leader 3

43. Do you keep the team informed of ALL matters affecting team performance or are you selective in the information you provide?

____ yes (inform them of everything of relevance)

____ no (inform them of selective information)

a) If selective, what information do you discuss with the team, what information do you withhold, and how do you determine what should be withheld?

b) Does it differ for the different leaders?

____ yes ____ no If yes, how so?

Leader 2

Leader 3

44. Do you announce and explain your plans for achieving the team goal?

____ yes ____ no

a) Does it differ for the different leaders?

____ yes ____ no If yes, how so?

Leader 2

Leader 3

45. Do you ask for input from members when faced with a problem?

____ yes ____ no

a) Does it differ for the different leaders?

____ yes ____ no If yes, how so?

Leader 2

Leader 3

46. Do you discuss potential problems with team members?

____ yes ____ no

a) Does it differ for the different leaders?

____ yes ____ no If yes, how so?

Leader 2

Leader 3

EVALUATION, REWARD, & PUNISHMENT

47. Do you evaluate the team's performance?

____ yes ____ no

a) If yes, are the evaluations formal, informal, or both?

b) How about the other leaders?

Leader 2 ____ yes ____ no ____ formal ____ informal

Leader 3 ____ yes ____ no ____ formal ____ informal

48. Do you focus more on evaluating the overall performance of the team or the individual contributions of the members?

____ overall team ____ each member ____ both equally

a) Does it differ for the different leaders?

____ yes ____ no If yes, how so?

Leader 2

Leader 3

49. Do you recognize and reward good performance by individuals on the team?

____ yes ____ no

a) How about the other leaders?

Leader 2 ____ yes ____ no

Leader 3 ____ yes ____ no

50. Do you recognize and reward good performance by the team as a whole?

____ yes ____ no

a) How about the other leaders?

Leader 2 ____ yes ____ no

Leader 3 ____ yes ____ no

51. What types of rewards do you provide for good performance?

____ praise

____ monetary bonus

____ pay raise

____ certificates, plaques

____ gifts

____ time off with pay, comp time, vacation time

____ meals

____ award ceremonies

____ new assignments, added responsibility

____ other

a) Are the types of rewards given the same for individuals as for the entire team or do they differ? explain any differences

b) What rewards do the other leaders provide for good performance?

Leader 2

Leader 3

52. Do you consider teamwork skills to be just as important as technical or task skills, more important than task skills, or less important than task skills? Why?

____ equal

____ team skills more important than task skills

____ task skills more important than team skills

53. Do you recognize and reward team performance as much or more than individual performance?

____ recognize and reward team performance most

____ recognize and reward individual performance most

____ recognize and reward both equally

a) How about the other leaders?

Leader 2

Leader 3

54. Do you acknowledge or punish the team or team members for poor performance?

____ yes ____ no

Other leaders?

Leader 2

Leader 3

a) If yes, do you discipline or punish the entire team or only the member or members that are performing poorly?

____ entire team ____ specific member ____ both

Other leaders?

Leader 2

Leader 3

b) What types of discipline or punishments do you provide for poor performance?

____ verbal reprimand to team

____ verbal reprimand to member

____ dock pay

____ suspend member from participating in team activities for a certain period of time

____ remove the member from the team

____ official reprimand in member's personnel file

____ requiring extra work or extra time to correct problem

____ have a developmental discussion with the member rather than disciplining member per se

____ have a developmental discussion with the entire team rather than disciplining member per se

____ reassign member to a new position, change member's job duties

____ withhold rewards

____ other

How about the other leaders?

Leader 2

Leader 3

GOAL SETTING

55. Do you set specific goals or provide specific direction for the team?

____ yes ____ no (goals are broad and general)

How about the other leaders?

Leader 2

Leader 3

56. Do you set challenging goals for the team?

____ yes (goals that stretch capabilities of the team)

____ no (goals are set that can be easily achieved)

How about the other leaders?

Leader 2

Leader 3

57. Do you actively work to keep the team focused on the task at hand?

____ yes ____ no If yes, how?

How about the other leaders?

Leader 2

Leader 3

58. Does the team need guidance or leadership to perform its tasks effectively or can the team operate effectively on its own without leadership?

____ yes ____ no

a) If yes, are there any cases where leadership is not needed to be effective?

____ no, team always needs leadership to be effective

____ yes, team can be effective doing routine tasks on its own but not during crises

____ yes, on simple tasks but not complex tasks

____ yes, during short periods or limited work cycles

____ other

b) If no, when can the team function effectively without leadership?

____ always, they don't need leadership to be effective

____ when they are performing simple or routine tasks that they are familiar with

____ for short periods or limited work cycles

____ during work phases prior to product output or mission completion

____ other

APPENDIX D

Team Leadership Questionnaire:

Study 1

Present/Leader Version

TEAM LEADERSHIP

Questionnaire

Name _____

Age _____

Race _____

Gender _____

Organization _____

Team _____

Date _____/_____/_____

How long have you been the leader of this team?

_____ years _____ months

Compared to how long your team has been in existence, how long have you been the leader of the team? (circle one)

1 = For a relatively short period of time; less than half as long as the team has been around

2 = For a moderate period of time relative to how long the team has been around; about half as long as the team has been in existence

3 = For a relatively long period of time; nearly as long as the team has been around

4 = I have been the leader since the team was first formed

1. How stable is your team's leadership? (check the best answer)

____ very stable; same leaders and/or leadership practices we have always had

____ moderately stable; leaders change periodically or leadership practices are changed periodically

____ moderately unstable; leaders and/or leadership practices change on a regular, though not necessarily frequent, basis

____ very unstable; leadership is in a constant state of change with different leaders and leadership practices being introduced on a regular and frequent basis

2. Please rank order the following approaches to leadership from 1 = most appropriate for this type of team to 5 = least appropriate for this type of team.

____ Someone who gets the most out of the team members in terms of effort and performance, and who accomplishes the task most efficiently and with minimal loss of time.

____ Someone who keeps things running smoothly, gives support to members when needed, and allows everyone to participate in discussions and decisions.

____ Someone who can keep the team focused on its task and keep disagreement to a minimum by resolving differences of opinion with a majority vote of the members.

____ Someone who shares the actual leadership so that all members feel equally responsible for getting the job done and maintaining good interpersonal relations.

____ Someone who takes full responsibility for the team's efforts and who avoids involving everyone in the problems that arise.

3. Using the scale below, please rate the effectiveness of each of the following approaches to selecting a leader or filling the leadership position. Ask yourself, "how effective would this be in selecting my team's leader?"

1	2	3	4	5
completely ineffective	not very effective	adequate	effective	very effective

_____ The person who can make the best contribution to the team's activity while still maintaining good relations with most members should be designated as the leader.

_____ The leader should be selected or appointed by some impartial authority outside the team.

_____ The person who has the most knowledge about a given issue should be the temporary leader and used as a resource person as long as the team's activity relates that person's area of expertise.

_____ The person who has demonstrated ability to help members work together cooperatively -- regardless of that person's own knowledge of the task -- should be used as the team's informal leader.

_____ Leadership should be assumed by the member who has enough faith in his or her own convictions to directly confront disagreement and lack of support without compromising the quality of decisions.

4. Please rank order the following approaches to leadership from 1 = most appropriate for this type of team to 5 = least appropriate for this type of team.

_____ The leader has the final say as to the solutions incorporated in all team decisions, since he or she is responsible for the outcomes.

_____ The leader polls the team on each available alternative and selects the decision that receives the support of the majority.

_____ All members are equal parties to decision making and the final decision reflects the agreed upon ideas of all members.

_____ Decisions are reached in an impersonal manner based on existing rules, regulations, precedents.

_____ Leader serves as a moderator, smoothing the way for agreement & helping members work together.

5. Which of the following best describes your team? (check one)

____ Manager-led -- the team has an identifiable leader who monitors and manages the performance process, structures the team, and sets overall direction. Members execute the tasks.

____ Self-managing -- team members execute the task and also manage their own work processes and performance, while others set goals, structure, and provide supports

____ Self-designing -- in addition to being self-managing the team members have authority to modify the design of the team and the context in which the team functions

____ Self-governing -- team members have complete responsibility for: deciding what to do and how to do it, structuring the team and its context, monitoring and managing performance, and actually carrying out the work

6. How much authority do you have to make decisions affecting the entire team? (check one)

____ none -- all decisions about the team are joint or require approval from others

____ some -- can make minor decisions without approval or support

____ considerable -- can make most team-related decisions on my own but some require approval

____ absolute -- have authority to make all team-related decisions

7. What is the basis of your power or influence over the team? (check all that apply)

____ authority provided through my designated position as team leader

____ my expertise regarding the team tasks

____ the friendship and trust that exists between me and the members

____ force; ability to coerce members into performing and punish members for non-performance

____ reward; ability to provide rewards to members for performing as desired

8. Using the scale below, indicate the impact that each of the following factors has on the effectiveness of leadership in this type of team. Ask yourself, "what impact does this have on leadership effectiveness?"

1 = None; it's irrelevant

2 = Minor or minimal impact on leadership effectiveness

3 = Moderate impact on leadership effectiveness

4 = Major impact on leadership effectiveness

5 = Critical; it can determine the difference between success and failure

____ Gender of the team leader(s)

____ Race of the team leader(s)

____ Age of the team leader(s)

____ Tenure of the team leader(s) with a particular team

____ The amount of team leadership experience possessed by the team leader(s)

____ Personality of the team leader(s); being open, warm, and friendly with all team members

APPENDIX E

Leadership Behaviors and Tasks Form:

Study 1

LEADERSHIP BEHAVIORS AND TASKS

Directions: For each of the following behaviors and task statements indicate: 1) the extent to which it is part of the leadership activities for this team, and 2) its importance for successful leadership by checking the appropriate boxes. You should have two checkmarks for each item, one for extent of involvement and one for importance.

	Extent of Involvement				Importance			
	not part of leadership	minor	moderate	major	Not important	minor	moderate	major
1. Planning team tasks and activities	☐	☐	☐	☐	☐	☐	☐	☐
2. Stating expectations; indicating what is expected of members and what members can expect from leader	☐	☐	☐	☐	☐	☐	☐	☐
3. Scheduling team tasks and activities	☐	☐	☐	☐	☐	☐	☐	☐
4. Organizing/coordinating team tasks and activities	☐	☐	☐	☐	☐	☐	☐	☐
5. Analyzing information or data	☐	☐	☐	☐	☐	☐	☐	☐
6. Organizing, synthesizing, or integrating information or data	☐	☐	☐	☐	☐	☐	☐	☐
7. Making presentations regarding team activities to individuals or groups outside the team	☐	☐	☐	☐	☐	☐	☐	☐
8. Making team-related decisions	☐	☐	☐	☐	☐	☐	☐	☐
9. Facilitating collaborative/joint decision making among team members	☐	☐	☐	☐	☐	☐	☐	☐

	Extent of Involvement				Importance			
	not part of leadership	minor	moderate	major	Not important	minor	moderate	major
10. Solving team-related problems	☐	☐	☐	☐	☐	☐	☐	☐
11. Facilitating collaborative/joint problem solving among team members	☐	☐	☐	☐	☐	☐	☐	☐
12. Generating consensus/agreement on team-related matters	☐	☐	☐	☐	☐	☐	☐	☐
13. Evaluating individual member performance	☐	☐	☐	☐	☐	☐	☐	☐
14. Evaluating overall team performance	☐	☐	☐	☐	☐	☐	☐	☐
15. Obtaining needed resources for team (tools, space, money, equipment, etc.)	☐	☐	☐	☐	☐	☐	☐	☐
16. Distributing needed resources to the team	☐	☐	☐	☐	☐	☐	☐	☐
17. Coaching/advising team members	☐	☐	☐	☐	☐	☐	☐	☐
18. Counseling/consoling team members	☐	☐	☐	☐	☐	☐	☐	☐
19. Negotiating with outsiders regarding team issues	☐	☐	☐	☐	☐	☐	☐	☐
20. Orienting new members	☐	☐	☐	☐	☐	☐	☐	☐
21. Instructing/training new members	☐	☐	☐	☐	☐	☐	☐	☐
22. Instructing/training existing members	☐	☐	☐	☐	☐	☐	☐	☐
23. Conducting/directing team-related meetings	☐	☐	☐	☐	☐	☐	☐	☐
24. Attending team-related meetings	☐	☐	☐	☐	☐	☐	☐	☐

	Extent of Involvement				Importance			
	not part of leadership	minor	moderate	major	Not important	minor	moderate	major
25. Supporting efforts of all members; standing behind the team	☐	☐	☐	☐	☐	☐	☐	☐
26. Providing positive feedback to members	☐	☐	☐	☐	☐	☐	☐	☐
27. Providing negative feedback to members	☐	☐	☐	☐	☐	☐	☐	☐
28. Confronting and resolving poor performance by a team member	☐	☐	☐	☐	☐	☐	☐	☐
29. Confronting and resolving poor performance by the entire team	☐	☐	☐	☐	☐	☐	☐	☐
30. Monitoring team performance	☐	☐	☐	☐	☐	☐	☐	☐
31. Discussing relevant issues with members	☐	☐	☐	☐	☐	☐	☐	☐
32. Listening to team members	☐	☐	☐	☐	☐	☐	☐	☐
33. Assisting or backing up members	☐	☐	☐	☐	☐	☐	☐	☐
34. Motivating/inspiring members	☐	☐	☐	☐	☐	☐	☐	☐
35. Clarifying expectations for each member's role	☐	☐	☐	☐	☐	☐	☐	☐
36. Establishing norms or boundaries for acceptable team behavior	☐	☐	☐	☐	☐	☐	☐	☐
37. Rewarding individual members	☐	☐	☐	☐	☐	☐	☐	☐
38. Rewarding entire team	☐	☐	☐	☐	☐	☐	☐	☐
39. Disciplining members	☐	☐	☐	☐	☐	☐	☐	☐

	Extent of Involvement				Importance			
	not part of leadership	minor	moderate	major	Not important	minor	moderate	major
40. Disciplining entire team	☐	☐	☐	☐	☐	☐	☐	☐
41. Getting to know members as individuals	☐	☐	☐	☐	☐	☐	☐	☐
42. Delegating work/assigning duties	☐	☐	☐	☐	☐	☐	☐	☐
43. Engaging the team in organizational activities	☐	☐	☐	☐	☐	☐	☐	☐
44. Establishing/defining clear and specific team boundaries; distinguishing between team and non-team activities, functions, and issues	☐	☐	☐	☐	☐	☐	☐	☐
45. Managing boundaries; protecting the team from outside influences	☐	☐	☐	☐	☐	☐	☐	☐
46. Managing diversity/heterogeneity/difference among members	☐	☐	☐	☐	☐	☐	☐	☐
47. Modeling effective teamwork behaviors	☐	☐	☐	☐	☐	☐	☐	☐
48. Taking personal responsibility for outcomes	☐	☐	☐	☐	☐	☐	☐	☐
49. Holding members responsible/accountable for outcomes	☐	☐	☐	☐	☐	☐	☐	☐
50. Facilitating shared leadership; developing leadership in all members	☐	☐	☐	☐	☐	☐	☐	☐
51. Structuring, designing, or building the team; creating and filling roles	☐	☐	☐	☐	☐	☐	☐	☐
52. Explaining actions and decisions to members	☐	☐	☐	☐	☐	☐	☐	☐

	Extent of Involvement				Importance			
	not part of leadership	minor	moderate	major	Not important	minor	moderate	major
53. Creating and managing team climate	☐	☐	☐	☐	☐	☐	☐	☐
54. Creating change; removing barriers to goals	☐	☐	☐	☐	☐	☐	☐	☐
55. Setting goals; stating objectives	☐	☐	☐	☐	☐	☐	☐	☐
56. Directing team performance	☐	☐	☐	☐	☐	☐	☐	☐
57. Encouraging open communication	☐	☐	☐	☐	☐	☐	☐	☐
58. Participating directly in team activities	☐	☐	☐	☐	☐	☐	☐	☐
59. Managing interpersonal conflict	☐	☐	☐	☐	☐	☐	☐	☐
60. Fostering team cohesion and team unity	☐	☐	☐	☐	☐	☐	☐	☐
61. Fostering team morale and team spirit	☐	☐	☐	☐	☐	☐	☐	☐
62. Fostering team commitment; ensuring members are committed to the team	☐	☐	☐	☐	☐	☐	☐	☐
63. Emphasizing working towards a common goal	☐	☐	☐	☐	☐	☐	☐	☐
64. Building or inspiring faith, loyalty, and trust in the team	☐	☐	☐	☐	☐	☐	☐	☐
65. Encouraging creativity and innovation	☐	☐	☐	☐	☐	☐	☐	☐
66. Strategic thinking; developing strategies	☐	☐	☐	☐	☐	☐	☐	☐
67. Challenging members to expand their skills and abilities; presenting challenging opportunities	☐	☐	☐	☐	☐	☐	☐	☐

	Extent of Involvement				Importance			
	not part of leadership	minor	moderate	major	Not important	minor	moderate	major
68. Recognizing and encouraging unique potential and abilities of members	☐	☐	☐	☐	☐	☐	☐	☐
69. Keeping members informed of all relevant events and information	☐	☐	☐	☐	☐	☐	☐	☐
70. Anticipating and planning for crisis situations; preparing team for such crises	☐	☐	☐	☐	☐	☐	☐	☐
71. Reducing ambiguity/uncertainty	☐	☐	☐	☐	☐	☐	☐	☐
72. Providing or fostering autonomy	☐	☐	☐	☐	☐	☐	☐	☐
73. Giving members the freedom and responsibility to operate with little or no supervision	☐	☐	☐	☐	☐	☐	☐	☐
74. Serving as the representative of the team to those outside the team	☐	☐	☐	☐	☐	☐	☐	☐
75. Reassigning or adjusting the activities of individual members to ensure goals are met	☐	☐	☐	☐	☐	☐	☐	☐
76. Coming up with new and innovative solutions to team-related problems	☐	☐	☐	☐	☐	☐	☐	☐
77. Investigating the cause of problems	☐	☐	☐	☐	☐	☐	☐	☐
78. Prioritizing; setting priorities for team and team member activities	☐	☐	☐	☐	☐	☐	☐	☐
79. Fostering support/commitment for team activities from individuals or groups outside the team	☐	☐	☐	☐	☐	☐	☐	☐

	Extent of Involvement				Importance			
	not part of leadership	minor	moderate	major	Not important	minor	moderate	major
80. Multi-tasking; performing multiple functions simultaneously	☐	☐	☐	☐	☐	☐	☐	☐
81. Scanning an uncertain environment for info.	☐	☐	☐	☐	☐	☐	☐	☐

APPENDIX F

KSAO Card Sort:

Study 1

KSAO Card Sort

For this task you should consider all teams of this type rather than just your team. Please sort each of the following knowledge, skills, abilities, and other characteristics into the response category you believe best represents the importance of that item for successful team leadership. As you go through the cards, ask yourself "How important is this for effective leadership in this type of team?" The categories are:

1 = Unimportant, not necessary for successful leadership

2 = Relevant, may be helpful but is not essential for success

3 = Moderately Important, has some impact on leadership success

4 = Very Important, has a strong impact on leadership success

5 = Critical, essential for successful leadership

____ Interpersonal skills

____ Oral communication skills

____ Written communication skills

____ Cognitive or thinking skills

____ Conflict management and conflict resolution skills

____ Project management skills

____ Teamwork process management skills

____ Problem-solving skills

____ Decision-making skills

____ Planning and organizing skills

____ Creativity and innovation

____ Abstract reasoning ability

____ Being friendly and approachable to all members

____ Being a member of the team as well as the leader

____ Having formal as opposed to informal leadership

____ Knowledge or understanding of teamwork and team performance concepts

____ Knowledge or understanding of all aspects of team functioning; knowledge of the tasks performed in this type of team

____ Knowledge or understanding of the operations and activities of each individual team member

____ Continual learning

____ Fairness and impartiality toward all members

____ Previous leadership experience

____ Previous team leadership experience

____ Previous experience as a member of a team

____ Previous experience as a member of this type of team

____ Previous experience as a leader of this type of team

____ Leadership ability

____ Ability to handle crises, trauma, or life/death situations

____ Personal commitment to the team and team members

____ Personal commitment to the team's goal

____ Flexibility and open-mindedness to new ideas and information

____ Leadership stability -- consistency in leaders and leadership practices

____ Charisma; ability to obtain devotion & loyalty from members

____ Above average intelligence

____ Special physical abilities

____ Tolerance for ambiguity or uncertainty

____ Sensitivity; concern for others

APPENDIX G

LBDQ for Team Leadership:

Study 1

LBDQ for Team Leadership

Please indicate the extent to which the leader of this type of team engages in the following activities by sorting the activity cards into the appropriate response category. As you go through the cards, ask yourself "To what extent do leaders of this type of team do this activity?" The categories are:

1	2	3	4	5
Never	Seldom	Occasionally	Often	Always

(representation)

____ Act as the spokesperson for the team

____ Publicize the activities of the team

____ Speak as the representative of the team

____ Speak for the team when visitors are present

____ Represent the team at outside meetings

(initiating structure)

____ Let the team know what is expected of them

____ Encourage the use of uniform procedures

____ Try out new ideas in the team

____ Make their attitudes clear to the team

____ Decide what should be done and how it will be done

____ Assign team members to particular tasks

____ Make sure that their part in the team is understood by the members

____ Schedule the work to be done

____ Maintain definite standards of performance

____ Ask that team members follow standard rules and regulations

____ Put the team's welfare above the welfare of any member in it

____ Emphasize meeting deadlines

____ Meet with the team at regularly scheduled times

____ Develop and set strategies for the team to follow

(tolerance of freedom)

____ Allow the members complete freedom in their work

____ Permit the members to use their own judgement in solving problems

____ Encourage initiative in the team members

____ Let the members do the work the way they think best

____ Assign a task, then let the team members handle it

____ Turn the members loose on a job, and let them go to it

____ Show reluctance in allowing the members freedom of action

____ Allow the team a high degree of initiative

____ Trust members to exercise good judgment

____ Permit the team to set its own pace

____ Provide the members with autonomy

(role assumption)

____ Show reluctance about taking initiative in the team

____ Fail to take necessary action

____ Let others take away their leadership in the team

____ Let members take advantage of them

____ Serve as leader of the team in name only

____ Back down to others rather than standing firm

____ Let others have authority that they should keep

____ Take full charge when emergencies arise

____ Overcome attempts made to challenge their leadership

(integration)

____ Keep the members working together as a team

____ Settle conflicts when they occur in the team

____ See to it that work of the team is coordinated

____ Help team members settle their differences

____ Maintain a closely knit team

(consideration)

____ Do little things to make it pleasant to be a member of the team

____ Put suggestions made by the team into operation

____ Treat team members as equals rather than subordinates

____ Give advanced warning of changes whenever possible

____ Keep to themselves

____ Look out for the personal welfare of the team members

____ Refuse to explain their actions

____ Act without consulting the team

____ Do personal favors for members of the team

____ Insist that everything be done their way

____ Discuss important matters with the team before acting

____ Remain sensitive to the needs and concerns of all members

____ Interact socially with members of the team

Transformational Leadership

(charismatic leadership)

____ Convey a sense of purpose or mission to the members

____ Inspire complete faith and loyalty from the members

____ Motivate members to achieve difficult goals

____ Get members to surpass their own individual needs for the sake of the team

(intellectual stimulation)

____ Encourage members to look at every situation from new and different perspectives

____ Prompt members to think

____ Stimulate members intellectually

(individualized consideration)

____ Recognize and encourage the unique potential and abilities in each team member

____ Delegate challenging work

____ Increase member responsibility

____ Keep members informed of relevant events

____ Act as a mentor to the team members

APPENDIX H

Leader Involvement Card Sort:

Study 1

Leader Involvement Card Sort

Please answer the questions printed on the cards by placing each card in the response category that best answers that particular question. The response categories are:

1 = Not at all; never

2 = To a minor degree; to a minimal extent; rarely; seldom

3 = To a moderate degree; to some extent; sometimes; occasionally

4 = To a high degree; to a great extent; frequently; often

5 = Completely; entirely; always

____ To what extent does the team task itself provide direction and leadership to the team members?

____ To what extent must team members seek needed support and encouragement from one another rather than a team leader?

____ To what extent does the team's direction and leadership come from the team itself (the members) as opposed to an identifiable team leader?

____ To what extent does the team's direction and leadership come from the team's goal, mission, or objective?

____ To what extent does the team determine its own methods, procedures, and schedules for completing work?

____ To what extent does the team, rather than the team leader, assign tasks and determine the roles to be filled by each member?

____ To what extent is the team self-directed rather than being directed or led by a designated leader?

____ To what extent does the team's direction and leadership come from a formal leader outside the team (i.e., a designated leader who is not actually a member of the team)?

____ To what extent does the team's direction and leadership come from a formal leader inside the team (i.e., a designated leader who is also a member of the team)?

____ To what extent does the team's direction and leadership come from an informal leader outside the team (i.e., someone who guides or leads the team but is not designated as team leader and/or does not have specified leadership authority)?

____ To what extent does the team's direction and leadership come from an informal leader inside the team (i.e., a team member who guides or leads the team but is not designated as team leader and/or does not have specified leadership authority)?

____ To what extent does the leader perform the same activities and functions as the other team members?

____ To what extent should the leader be an expert in each of the team positions?

____ To what extent is the leader actually involved with the team or in team activities?

____ To what extent does the leader simply oversee the operations of the team without being directly involved in contributing to the team's output?

____ To what extent is decision making shared among all members?

____ To what extent does the leader **allow** team members to freely advance their opinions, ideas, and concerns?

____ To what extent does the leader **encourage** team members to freely advance their opinions, ideas, and concerns?

____ To what extent is the team designed to let everyone participate in decision making?

____ To what extent is the leader responsible for setting the goals, objectives, or mission of the team?

____ To what extent is the team responsible for setting its own goals?

____ To what extent does the nature of the team task determine the team's goal?

____ To what extent does a leader's tenure or experience on the team affect the team's success?

____ To what extent is the leader responsible for obtaining necessary organizational resources for the team (tools, space, money, equipment, etc)?

____ To what extent is the leader responsible for the training of the team members?

____ To what extent does the leader provide technical training to the team members?

____ To what extent does the leader provide quality and customer service training to the team members?

____ To what extent does the leader provide team skills training to the team members?

____ To what extent has the leader been trained about effective team skills?

____ To what extent is **the leader** responsible for ensuring that the team completes its task, mission, or project?

____ To what extent is **the leader** held accountable for the quality of the team's outcomes?

____ To what extent is **the team** responsible for ensuring that it completes its own task, mission, or project?

____ To what extent is **the team** held accountable for the quality of its own outcomes?

____ To what extent does **the leader** review the quality of the team's output?

____ To what extent is **the team** responsible for reviewing the quality of its own results?

____ To what extent does the leader work to **prevent** potential problems rather than solve problems as they arise?

APPENDIX I

Results of LISREL VII Confirmatory Factor Analysis:

LBDQ for Team Leadership

Table I1

Representation Subscale: Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	.824	.321	.679
Item 2	.098	.990	.010
Item 3	.785	.384	.616
Item 4	.609	.629	.371
Item 5	.541	.707	.293

Note. Lambda X = factor loadings. Theta Delta = measurement error variances. R^2 = item reliabilities. Goodness-of-fit indices are: χ^2 (df = 5, p>.01, ns) = 6.43; GFI = .965; AGFI = .895; and RMR = .047. Overall subscale reliability = .73. All T-values for structural coefficients (i.e., Lambda X) are statistically significant (p<.05), except for item 2.

Table I2

Initiating Structure Subscale: Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	.737	.457	.543
Item 2	.472	.778	.222
Item 3	.335	.888	.112
Item 4	.490	.760	.240
Item 5	.322	.897	.103
Item 6	.501	.749	.251
Item 7	.540	.708	.292
Item 8	.516	.733	.267
Item 9	.448	.799	.201
Item 10	.572	.673	.327
Item 11	-.177	.968	.032
Item 12	.609	.630	.370
Item 13	.541	.707	.293
Item 14	.766	.413	.587

Note. Lambda X = factor loadings. Theta Delta = error variances. R^2 = item reliabilities. Goodness-of-fit indices are: χ^2 (df = 77, p>.01, ns) = 103.17; GFI = .841; AGFI = .783; and RMR = .084. Overall subscale reliability = .81. All T-values for structural coefficients (i.e., Lambda X) are significant (p<.05), except for item 11.

Table I3

Tolerance of Freedom Subscale: Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	.730	.467	.533
Item 2	.659	.566	.434
Item 3	.446	.801	.199
Item 4	.741	.451	.549
Item 5	.362	.869	.131
Item 6	.492	.758	.242
Item 7	.304	.908	.092
Item 8	.571	.674	.326
Item 9	.337	.886	.114
Item 10	.468	.781	.219
Item 11	.776	.398	.602

Note. Lambda X = factor loadings. Theta Delta = measurement error variances. R^2 = item reliabilities. Goodness-of-fit indices are: χ^2 (df = 44, p<.01) = 69.25; GFI = .850; AGFI = .775; and RMR = .083. Overall subscale reliability = .82. All T-values for structural coefficients (i.e., Lambda X) are statistically significant (p<.05).

Table I4

Role Assumption Subscale: Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	.469	.780	.220
Item 2	.619	.617	.383
Item 3	.584	.659	.341
Item 4	.533	.716	.284
Item 5	.552	.695	.305
Item 6	.536	.713	.287
Item 7	.396	.843	.157
Item 8	.079	.994	.006
Item 9	.379	.856	.144

Note. Lambda X = factor loadings. Theta Delta = measurement error variances. R^2 = item reliabilities. Goodness-of-fit indices are: χ^2 (df = 27, $p<.01$) = 56.06; GFI = .858; AGFI = .763; and RMR = .100. Overall subscale reliability = .72. All T-values for structural coefficients (i.e., Lambda X) are statistically significant ($p<.05$), except for item 8.

Table I5

Integration Subscale: Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	.689	.525	.475
Item 2	.422	.822	.178
Item 3	.671	.550	.450
Item 4	.641	.589	.411
Item 5	.596	.645	.355

Note. Lambda X = factor loadings. Theta Delta = measurement error variances. R^2 = item reliabilities. Goodness-of-fit indices are: χ^2 (df = 5, p>.01, ns) = 6.50; GFI = .961; AGFI = .884; and RMR = .053. Overall subscale reliability = .74. All T-values for structural coefficients (i.e., Lambda X) are statistically significant (p<.05).

Table I6

Consideration Subscale: Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	.335	.888	.112
Item 2	.511	.739	.261
Item 3	.649	.578	.422
Item 4	.372	.862	.138
Item 5	.521	.729	.271
Item 6	.296	.912	.088
Item 7	.425	.819	.181
Item 8	.757	.427	.573
Item 9	.208	.957	.043
Item 10	.315	.901	.099
Item 11	.725	.475	.525
Item 12	.509	.740	.260
Item 13	.545	.703	.297

Note. Lambda X = factor loadings. Theta Delta = measurement error variances. R^2 = item reliabilities. Goodness-of-fit indices are: χ^2 (df = 65, p<.01) = 106.62; GFI = .808; AGFI = .731; and RMR = .100. Overall subscale reliability = .80. All T-values for structural coefficients (i.e., Lambda X) are statistically significant (p<.05), except for item 9.

Table I7

Transformational Leadership Subscale: Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	.483	.767	.233
Item 2	.628	.606	.394
Item 3	.417	.826	.174
Item 4	.338	.886	.114
Item 5	.614	.623	.377
Item 6	.729	.468	.532
Item 7	.753	.433	.567
Item 8	.700	.510	.490
Item 9	.529	.720	.280
Item 10	.658	.567	.433
Item 11	.359	.871	.129
Item 12	.426	.818	.182

Note. Lambda X = factor loadings. Theta Delta = measurement error variances. R^2 = item reliabilities. Goodness-of-fit indices are: χ^2 (df = 54, p>.01, ns) = 73.23; GFI = .852; AGFI = .787; and RMR = .081. Overall subscale reliability = .85. All T-values for structural coefficients (i.e., Lambda X) are statistically significant (p<.05).

APPENDIX J

Results of LISREL VII Confirmatory Factor Analysis:

Teamness Index

Table J1

Teamness Index: Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	.286	.918	.082
Item 2	.529	.720	.280
Item 3	.444	.803	.197
Item 4	.687	.528	.472
Item 5	.293	.914	.086
Item 6	.529	.720	.280
Item 7	.484	.766	.234
Item 8	.478	.772	.228

Note. Lambda X = factor loadings. Theta Delta = measurement error variances. R^2 = item reliabilities. Goodness-of-fit indices are: χ^2 (df = 20, p>.01, ns) = 33.43; GFI = .890; AGFI = .801; and RMR = .091. Overall scale reliability = .69. All T-values for structural coefficients (i.e., Lambda X) are statistically significant (p<.05).

APPENDIX K

Results of LISREL VII Confirmatory Factor Analysis:

Leadership Behaviors and Tasks Form

Table K1

LBT, Factor 1 (Information & Boundary Management): Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	.723	.478	.522
Item 2	.859	.261	.739
Item 3	.791	.374	.626
Item 4	.610	.628	.372
Item 5	.555	.692	.308
Item 6	.673	.547	.453
Item 7	.547	.701	.299
Item 8	.615	.621	.379
Item 9	.606	.633	.367
Item 10	.504	.746	.254
Item 11	.598	.643	.357
Item 12	.462	.786	.214
Item 13	.457	.791	.209
Item 14	.703	.506	.494
Item 15	.650	.577	.423
Item 16	.687	.528	.472
Item 17	.620	.615	.385
Item 18	.573	.671	.329
Item 19	.677	.542	.458
Item 20	.645	.583	.417
Item 21	.259	.933	.067

Note. Lambda X = factor loadings. Theta Delta = measurement error variances. R^2 = item reliabilities. Goodness-of-fit indices are: χ^2 (df = 189, p<.01) = 352.38; GFI = .686; AGFI = .616; and RMR = .088. Overall factor reliability = .93. All T-values for structural coefficients (i.e., Lambda X) are statistically significant (p<.05).

Table K2

LBT, Factor 2 (Initiating Structure): Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	.490	.760	.240
Item 2	.618	.618	.382
Item 3	.728	.470	.530
Item 4	.521	.728	.272
Item 5	.386	.851	.149
Item 6	.626	.608	.392
Item 7	.598	.642	.358
Item 8	.436	.810	.190
Item 9	.659	.565	.435
Item 10	.498	.752	.248
Item 11	.687	.528	.472
Item 12	.518	.732	.268
Item 13	.597	.643	.357
Item 14	.650	.577	.423
Item 15	.751	.435	.565
Item 16	.674	.545	.455
Item 17	.651	.577	.423
Item 18	.657	.568	.432
Item 19	.659	.565	.435
Item 20	.497	.753	.247
Item 21	.653	.573	.427

Note. Lambda X = factor loadings. Theta Delta = measurement error variances. R^2 = item reliabilities. Goodness-of-fit indices are: χ^2 (df = 189, $p<.01$) = 309.78; GFI = .735; AGFI = .676; and RMR = .080. Overall factor reliability = .92. All T-values for structural coefficients (i.e., Lambda X) are statistically significant ($p<.05$).

Table K3

LBT, Factor 3 (Consideration): Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	.639	.591	.409
Item 2	.715	.488	.512
Item 3	.760	.423	.577
Item 4	.531	.718	.282
Item 5	.715	.489	.511
Item 6	.470	.779	.221
Item 7	.373	.861	.139
Item 8	.488	.762	.238
Item 9	.684	.532	.468
Item 10	.607	.631	.369
Item 11	.567	.678	.322
Item 12	.665	.557	.443
Item 13	.686	.529	.471
Item 14	.496	.754	.246
Item 15	.653	.574	.426
Item 16	.400	.840	.160

Note. Lambda X = factor loadings. Theta Delta = measurement error variances. R^2 = item reliabilities. Goodness-of-fit indices are: χ^2 (df = 104, $p<.01$) = 253.58; GFI = .692; AGFI = .597; and RMR = .106. Overall factor reliability = .90. All T-values for structural coefficients (i.e., Lambda X) are statistically significant ($p<.05$).

Table K4

LBT, Factor 4 (Administrative Duties): Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	.448	.799	.201
Item 2	.690	.524	.476
Item 3	.710	.497	.503
Item 4	.707	.500	.500
Item 5	.585	.658	.342
Item 6	.634	.599	.401
Item 7	.543	.705	.295
Item 8	.700	.510	.490
Item 9	.673	.547	.453

Note. Lambda X = factor loadings. Theta Delta = measurement error variances. R^2 = item reliabilities. Goodness-of-fit indices are: χ^2 (df = 27, p>.01, ns) = 38.33; GFI = .886; AGFI = .810; and RMR = .067. Overall factor reliability = .86. All T-values for structural coefficients (i.e., Lambda X) are statistically significant (p<.05).

APPENDIX L

Results of LISREL VII Confirmatory Factor Analysis:

KSAO Card Sort

Table L1

KSAO Factor 1 (Management Skills): Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	.492	.758	.242
Item 2	.459	.789	.211
Item 3	.402	.838	.162
Item 4	.440	.806	.194
Item 5	.412	.830	.170
Item 6	.554	.693	.307
Item 7	.714	.490	.510
Item 8	.515	.734	.266
Item 9	.550	.697	.303
Item 10	.734	.461	.539
Item 11	.493	.757	.243
Item 12	.440	.806	.194

Note. Lambda X = factor loadings. Theta Delta = measurement error variances. R^2 = item reliabilities. Goodness-of-fit indices are: χ^2 (df = 54, $p<.01$) = 99.74; GFI = .836; AGFI = .762; and RMR = .089. Overall factor reliability = .82. All T-values for structural coefficients (i.e., Lambda X) are statistically significant ($p<.05$).

Table L2

KSAO Factor 2 (Experience): Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	.252	.937	.063
Item 2	.914	.165	.835
Item 3	.975	.049	.951
Item 4	.567	.678	.322
Item 5	.643	.587	.413
Item 6	.781	.390	.610
Item 7	.478	.771	.229

Note. Lambda X = factor loadings. Theta Delta = measurement error variances. R^2 = item reliabilities. Goodness-of-fit indices are: χ^2 (df = 14, p<.01) = 69.70; GFI = .804; AGFI = .608; and RMR = .105. Overall factor reliability = .86. All T-values for structural coefficients (i.e., Lambda X) are statistically significant (p<.05).

Table L3

KSAO Factor 3 (Consideration): Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	.793	.371	.629
Item 2	.522	.727	.273
Item 3	.708	.499	.501
Item 4	.386	.851	.149
Item 5	.543	.705	.295
Item 6	.355	.874	.126
Item 7	.481	.769	.231
Item 8	.609	.629	.371

Note. Lambda X = factor loadings. Theta Delta = measurement error variances. R^2 = item reliabilities. Goodness-of-fit indices are: χ^2 (df = 20, p>.01, ns) = 34.97; GFI = .902; AGFI = .824; and RMR = .077. Overall factor reliability = .78. All T-values for structural coefficients (i.e., Lambda X) are statistically significant (p<.05).

Table L4

KSAO Factor 4 (Cognition): Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	.558	.689	.311
Item 2	.458	.790	.210
Item 3	.526	.723	.277
Item 4	.851	.276	.724
Item 5	.622	.613	.387
Item 6	.614	.622	.378
Item 7	.284	.919	.081
Item 8	.622	.614	.386

Note. Lambda X = factor loadings. Theta Delta = measurement error variances. R^2 = item reliabilities. Goodness-of-fit indices are: χ^2 (df = 20, $p<.01$) = 38.66; GFI = .896; AGFI = .813; and RMR = .072. Overall factor reliability = .80. All T-values for structural coefficients (i.e., Lambda X) are statistically significant ($p<.05$).

APPENDIX M

Results of LISREL VII Confirmatory Factor Analysis:

Leader Involvement Card Sort

Table M1

LI, Factor 1 (Leader Training Responsibilities): Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	.820	.327	.673
Item 2	.869	.245	.755
Item 3	.735	.459	.541
Item 4	.555	.692	.308
Item 5	.584	.659	.341

Note. Lambda X = factor loadings. Theta Delta = measurement error variances. R^2 = item reliabilities. Goodness-of-fit indices are: χ^2 (df = 5, p<.01) = 19.57; GFI = .892; AGFI = .676; and RMR = .074. Overall factor reliability = .84. All T-values for structural coefficients (i.e., Lambda X) are statistically significant (p<.05).

Table M2

LI, Factor 2 (Team Responsibility for Outcomes): Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	.883	.220	.780
Item 2	.808	.348	.652
Item 3	.665	.557	.443
Item 4	.683	.533	.467
Item 5	.289	.916	.084

Note. Lambda X = factor loadings. Theta Delta = measurement error variances. R^2 = item reliabilities. Goodness-of-fit indices are: χ^2 (df = 5, p>.01, ns) = 2.56; GFI = .985; AGFI = .955; and RMR = .028. Overall factor reliability = .81. All T-values for structural coefficients (i.e., Lambda X) are statistically significant (p<.05).

Table M3

LI, Factor 3 (Leader Involvement in Team Activities): Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	.731	.466	.534
Item 2	.686	.529	.471
Item 3	-.474	.775	.225
Item 4	.644	.586	.414
Item 5	.450	.798	.202

Note. Lambda X = factor loadings. Theta Delta = measurement error variances. R^2 = item reliabilities. Goodness-of-fit indices are: χ^2 (df = 5, p>.01, ns) = 5.29; GFI = .969; AGFI = .907; and RMR = .045. Overall factor reliability = .56. All T-values (absolute values) for structural coefficients (i.e., Lambda X) are statistically significant (p<.05).

Table M4

LI, Factor 4 (Leader Traits): Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	.301	.909	.091
Item 2	.837	.299	.701
Item 3	.994	.011	.989
Item 4	.210	.956	.044
Item 5	.302	.909	.091

Note. Lambda X = factor loadings. Theta Delta = measurement error variances. R^2 = item reliabilities. Goodness-of-fit indices are: χ^2 (df = 5, p<.01) = 17.79; GFI = .905; AGFI = .714; and RMR = .117. Overall factor reliability = .70. All T-values for structural coefficients (i.e., Lambda X) are statistically significant (p<.05), except for item 4.

Table M5

LI, Factor 5 (Self-direction): Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	.740	.453	.547
Item 2	.725	.475	.525
Item 3	.504	.746	.254

Note. Lambda X = factor loadings. Theta Delta = measurement error variances. R^2 = item reliabilities. Goodness-of-fit indices cannot be calculated due to zero degrees of freedom. Overall factor reliability = .70. All T-values for structural coefficients (i.e., Lambda X) are statistically significant ($p<.05$).

Table M6

LI, Factor 6 (Leader Responsibility for Outcomes): Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	1.017	-.034	1.034
Item 2	.540	.708	.292
Item 3	.577	.667	.333

Note. Lambda X = factor loadings. Theta Delta = measurement error variances. R^2 = item reliabilities. Goodness-of-fit indices cannot be calculated due to zero degrees of freedom. Overall factor reliability = .77. All T-values for structural coefficients (i.e., Lambda X) are statistically significant ($p<.05$).

APPENDIX N

Teamness Index:

Study 2

Teamness Index

Directions: Please rate each of the following statements according to the following five-point scale by writing the appropriate number in the blank to the left of the statement.

1	2	3	4	5
Strongly Disagree	Disagree	Unsure	Agree	Strongly Agree

____ 1. Team members need information, materials, or assistance from other members on the team in order to complete their tasks.

____ 2. Team members share a common and valued goal, mission, or objective.

____ 3. Team members must coordinate or time their activities in order to work together and achieve the team's goal, mission, or objective.

____ 4. Each member has a specific role or function on the team.

____ 5. Individual goals are related to the goals of the team.

____ 6. Team members must rely on one another for the team to achieve its goal, mission, or objective.

____ 7. Members consider themselves part of a team.

____ 8. Team members depend on each other to accomplish their tasks.

____ 9. Team members must communicate with each other in order to accomplish the team's goal, mission, or objective.

____ 10. An individual member cannot achieve the team's goal, mission, or objective on his/her own; it requires teamwork and a team effort.

____ 11. Team members must interact if the team is to accomplish its task or mission.

____ 12. An individual member cannot perform all of the tasks and functions of the team; it requires teamwork and a team effort.

APPENDIX O

Preliminary Questions:

Used to Select Appropriate Version of Interview and Questionnaire in Study 2

Preliminary Questions

1. Type of team:

2. Are you currently associated with the team or was your involvement with the team in the past?

   ____ present ____ past

3. Does the team have an identifiable leader?

   ____ yes ____ no (STOP, use the NO LEADER Version)

4. Are you a leader of the team?

   ____ yes (USE LEADER VERSION)

   ____ no (USE MEMBER VERSION)

5. Does your team have more than one leader? In other words, is there someone else inside or outside the team that plays a leadership role for the team?

   ____ yes (USE MULTI-LEADER VERSION)

   ____ no (USE SINGLE-LEADER VERSION)

APPENDIX P

Team Leadership Interview:

Study 2

Present/Multi-Leader/Leader Version

I'll be asking you a number of questions concerning team leadership. Unless I specify differently, please consider the specific team with which you are associated when responding to the questions. Okay? Do you have any questions before we begin?

1. You indicated that your team has more than one leader, how many leaders does the team have? _____

   describe each (position, role, title)

   Leader 1 Leader 2 Leader 3

2. In addition to being the team leader, are you also a member of the team?

   ____ yes ____ no

   How about the other leaders?

   Leader 2 ____ yes ____ no

   Leader 3 ____ yes ____ no

3. Are you the leader of more than one team? If so, how many teams do you lead?

   ____ yes ____ no How many ____

   How about the other leaders?

   Leader 2 ____ yes ____ no How many _____

   Leader 3 ____ yes ____ no How many _____

4. Tell me about the team's leadership. How is the team led, organized, and managed?

5. Do the leaders have an equal amount of power or influence over the team?

   yes ____ no ____

   a) Who has the most power? _____

   b) Who has the least? _____

6. How many members make up the team? _____

7. Were you, or any of the other leaders, a member of the team before becoming the leader or has your entire association with the team been as the leader?

Leader 1		Leader 2		Leader 3	
yes	no	yes	no	yes	no

8. Do you operate in the same area or environment as the rest of the team or do you operate separately from the team?

   ____ same environment as the team

   ____ sometimes with the team, sometimes away from team

   ____ away from the team in ____ a separate office

   ____ a remote area in the same general environment

   How about the other leaders?

   ____ yes ____ no If yes, explain the differences.

9. How does one become the leader of this type of team?

____ appointed by a superior

____ selected or hired for the position as in any other job

____ self-appointed or self-designated leader

____ elected by the team (based on experience and/or skill)

____ elected by outsiders (based on experience and/or skill)

____ based solely on experience or time with team (e.g., most senior member is leader)

____ based solely on expertise (e.g., the most skilled member is designated the leader)

____ combination of experience and expertise

____ by passing a test or training course, getting licensed, getting certified

____ by volunteering, requesting, or asking for it (with approval)

____ by being promoted from member to leader for good perf.

____ trying out or competing for it and winning the competition

____ by request; being asked by a member or superior to lead

____ other

a) Does the process differ for the different leaders?

____ yes ____ no If yes, how so?

Leader 2

Leader 3

10. Do you spend more time structuring the team's tasks and activities or managing the interaction among the members?

____ structuring tasks

____ managing interactions

____ equal

a) Does it differ for the different leaders?

____ yes ____ no If yes, how so?

Leader 2

Leader 3

11. What do you think is the single most important factor that distinguishes between effective and ineffective leadership in this type of team?

12. What does it take to be an effective team leader? Describe the five most important qualities or behaviors of an effective leader of this type of team.

1.

2.

3.

4.

5.

13. Do you and the other leaders make a direct, conscious effort to build a high level of trust among members? If so, how; what do you do?

14. If for some reason you were absent or unable to lead the team, how would your leadership duties and responsibilities be handled?

____ all team members would pitch in to handle the leadership duties and responsibilities

____ a team member would assume the duties

____ my superior would assume the duties and responsibilities

____ my co-leader(s) would assume the duties and responsibilities

____ the team would have to do without the leadership

____ the team would simply stop functioning

____ other

What if the other leaders were absent?

Leader 2

Leader 3

15. When, if ever, is it appropriate for a team member to assume the role of the team leader?

____ never

____ whenever the team leader is absent or unavailable

____ when a team issue arises in the member's area of expertise

____ when designated or assigned by the team leader

____ when designated or assigned by someone outside the team at a higher level (e.g., the team leader's superior)

____ for special projects

____ whenever they want

____ when the leader is in error or is incompetent

____ other

16. Are there any physical requirements for leading this team?

____ yes ____ no

a) If so, what are they?

b) Are these requirements different than those of the other team members?

____ yes (different) ____ no (same)

If yes, how are they different?

c) Do the requirements differ for the different leaders?

____ yes ____ no If yes, how so?

Leader 2

Leader 3

17. Is leadership on this team more of a mental activity or a physical activity? In other words, does leading this team involve more thinking or more doing?

____ mental ____ physical ____ equal

a) Does it differ for the different leaders?

____ yes ____ no If yes, how so?

Leader 2

Leader 3

18. Do you need to make more quick decisions or decisions requiring deep thought and careful reasoning?

____ quick ____ deep thought ____ equal

a) Does it differ for the different leaders?

____ yes ____ no If yes, how so?

Leader 2

Leader 3

19. Do you focus more on short-term planning or long-term planning?

____ short-term ____ long-term ____ equal

a) Does it differ for the different leaders?

____ yes ____ no If yes, how so?

Leader 2

Leader 3

20. Are most of the team-related problems that you deal with relatively complex or relatively simple and straightforward?

____ complex ____ simple ____ equal

a) Does it differ for the different leaders?

____ yes ____ no If yes, how so?

Leader 2

Leader 3

21. Is being an effective team leader a mentally challenging task? If yes, how so?

____ yes ____ no

22. What are the educational requirements, if any, for leading this team?

____ there are none

____ high school diploma

____ two year associates or technical degree

____ specialized training or education related to the team's task

____ specialized certificate or license

____ four year college degree (B.A., B.S.)

____ master's degree

____ doctoral degree -- Ph.D.

____ other

a) Does it differ for the different leaders?

____ yes ____ no If yes, how so?

Leader 2

Leader 3

23. Do you provide any training to the team members?

____ yes ____ no

a) What sort of training do you provide? (task/teamwork)

b) How about the other leaders, do they provide training?

Leader 2 ____ yes ____ no

Leader 3 ____ yes ____ no

c) What sort of training do they provide? (task/teamwork)

24. Have you received any training in team performance concepts or team leadership?

____ yes ____ no If yes, what was the nature of the training?

25. Do you manage or control the communication among team members? For example, do you control how or when team members can communicate?

____ yes ____ no If so, how?

a) Does it differ for the different leaders?

____ yes ____ no If yes, how so?

Leader 2

Leader 3

26. What means of communication do you most frequently use to communicate with team members?

____ face-to-face, one-on-one with each member

____ telephone

____ computer/e-mail

____ radio, walkie-talkie, intercom

____ memo, letter

____ team meeting; talk to entire team

____ other

a) Does it differ for the different leaders?

____ yes ____ no If yes, how so?

Leader 2

Leader 3

27. Do you formally announce and explain your plans for achieving the team goal?

____ yes ____ no

a) Does it differ for the different leaders?

____ yes ____ no If yes, how so?

Leader 2

Leader 3

28. Do you evaluate the team's performance?

____ yes ____ no

a) If yes, are the evaluations formal, informal, or both?

b) How about the other leaders?

Leader 2 ____ yes ____ no ____ formal ____ informal

Leader 3 ____ yes ____ no ____ formal ____ informal

29. Do you focus more on evaluating the overall performance of the team or the individual contributions of the members?

____ overall team ____ each member ____ both equally

a) Does it differ for the different leaders?

____ yes ____ no If yes, how so?

Leader 2

Leader 3

30. Do you recognize and reward good performance by individuals on the team?

____ yes ____ no

a) How about the other leaders?

Leader 2 ____ yes ____ no

Leader 3 ____ yes ____ no

b) What types of rewards do you provided to individuals for good performance?

____ praise

____ monetary bonus

____ pay raise

____ awards (certificates, plaques, trophies)

____ gifts

____ time off, comp time, vacation time

____ meals

____ ceremonies; parties

____ new assignments, added responsibility

____ reduced workload

____ other

c) What rewards do the other leaders provide for good performance?

Leader 2

Leader 3

31. Do you recognize and reward good performance by the team as a whole?

____ yes ____ no

a) How about the other leaders?

Leader 2 ____ yes ____ no

Leader 3 ____ yes ____ no

b) What types of rewards do you provide the entire team for good performance?

____ praise

____ monetary bonus

____ pay raise

____ awards (certificates, plaques, trophies)

____ gifts

____ time off, comp time, vacation time

____ meals

____ ceremonies; parties

____ new assignments, added responsibility

____ reduced workload

____ other

c) What rewards do the other leaders provide?

Leader 2

Leader 3

32. Do you consider teamwork skills to be just as important as technical or task skills, more important, or less important?

____ team skills more important than task skills

____ task skills more important than team skills

____ equal

33. Do you recognize and reward team performance or individual performance more?

____ team performance most

____ individual performance most

____ recognize and reward both equally

a) How about the other leaders?

Leader 2

Leader 3

34. Do you discipline or punish the team or team members for poor performance?

____ yes ____ no (So there are no repercussions for poor performance?)

Other leaders?

Leader 2 ____ yes ____ no

Leader 3 ____ yes ____ no

a) If yes, do you discipline or punish the entire team or only the member or members that are performing poorly?

____ entire team ____ specific member ____ both

Other leaders?

Leader 2

Leader 3

b) What types of discipline or punishments do you provide for poor performance?

____ verbal reprimand to team

____ verbal reprimand to member

____ dock pay

____ suspend member from participating in team activities for a certain period of time

____ remove the member from the team

____ official reprimand in member's personnel file

____ requiring extra work or extra time to correct problem

____ have a developmental discussion with the member rather than disciplining member per se

____ have a developmental discussion with the entire team rather than disciplining member per se

____ reassign member to a new position, change member's job duties

____ withhold rewards or take back rewards

____ requiring extra work or extra time to punish or sanction

____ other

How about the other leaders?

Leader 2

Leader 3

35. Do you set goals for the team?

____ yes ____ no

How about the other leaders?

Leader 2 ____ yes ____ no

Leader 3 ____ yes ____ no

a) Do you set very specific goals, or do the goals tend to be broad and general?

____ specific ____ broad & general

How about the other leaders?

Leader 2 ____ specific ____ general ____ N/A

Leader 3 ____ specific ____ general ____ N/A

b) Do you set challenging goals for the team that stretch the capabilities of the members, or do you set goals that can be easily achieved?

____ challenging ____ easy

How about the other leaders?

Leader 2 ____ challenging ____ easy ____ N/A

Leader 3 ____ challenging ____ easy ____ N/A

36. Do you actively work to keep the team focused on the task at hand?

____ yes ____ no If yes, how?

How about the other leaders?

Leader 2

Leader 3

37. Does the team need a leader to perform its tasks effectively or can the team operate effectively on its own without a leader?

____ yes (team needs a leader to be effective)

____ no (team does not need a leader to be effective)

a) If yes, are there any situations where a leader is not needed to be effective?

____ no, team always needs a leader to be effective

____ yes, team can be effective doing routine tasks on its own but not during crises

____ yes, on simple tasks but not complex tasks

____ yes, during short periods or limited work cycles

____ yes, once the team becomes more experienced or seasoned

____ during practice, but not performance

____ during performance, but not practice

____ other

b) If no, when can the team function effectively without a leader?

____ always, they don't <u>need</u> a designated leader to be effective

____ when they are performing simple or routine tasks that they are familiar with

____ for short periods or limited work cycles

____ during work phases prior to product output or mission completion

____ once the team becomes more experienced or seasoned

____ during practice, but not performance

____ during performance, but not practice

____ other

38. In what ways is leading this team different from leading a group of people that is not a team (such as a social group or an organizational department)?

APPENDIX Q

Team Leadership Questionnaire:

Study 2

Present/Leader Version

TEAM LEADERSHIP

Questionnaire

Name _____

Age _____

Race _____

Gender _____

Team _____

Organization _____

Today's Date _____/_____/_____

How long have you been the leader of this team?

_____ years _____ months

Compared to how long your team has been in existence, how long have you been the leader of the team? (check one)

____ For a relatively short period of time; less than half as long as the team has been around

____ For a moderate period of time relative to how long the team has been around; about half as long as the team has been in existence

____ For a relatively long period of time; nearly as long as the team has been around

____ I have been the leader since the team was first formed

1. How stable is your team's leadership? (check the best answer)

____ very stable; same leaders and/or leadership practices we have always had

____ moderately stable; leaders change periodically or leadership practices are changed periodically

____ moderately unstable; leaders and/or leadership practices change on a regular, though not necessarily frequent, basis

____ very unstable; leadership is in a constant state of change with different leaders and leadership practices being introduced on a regular and frequent basis

2. For **each** of the following pairs (a-h), check the item that best describes the style of leadership in your team.

a)
____ authoritative/autocratic
____ democratic

b)
____ directive
____ participative

c)
____ task-oriented
____ people-oriented

d)
____ structured
____ considerate

e)
____ hands-on
____ hands-off

f)
____ process-oriented
____ outcome-oriented

g)
____ friendly & approachable
____ reserved & distant

h)
____ formal
____ informal/casual

3. Which of the following best describes your team? (check one)

____ Manager-led -- the team has an identifiable leader who monitors and manages the performance process, structures the team, and sets overall direction. Members execute the tasks.

____ Self-managing -- team members execute the task and also manage their own work processes and performance, while others set goals, structure, and provide supports

____ Self-designing -- in addition to being self-managing the team members have authority to modify the design of the team and the context in which the team functions

____ Self-governing -- team members have complete responsibility for: deciding what to do and how to do it, structuring the team and its context, monitoring and managing performance, and actually carrying out the work

4. Does every member of the team consider you the leader?

____ yes ____ no ____ unsure

a) If no or unsure, why? (check one)

____ Because there is more than one leader, I may not be considered **the** leader by everyone

____ Because we share leadership, no one is considered the leader

____ I only consider myself the leader because I do more than anyone else to lead, guide, direct the team

____ I'm an informal leader rather than an appointed leader in a leadership position

____ It is a figurehead position with no real power or authority

____ Other _____

5. At what point in the life cycle of your team is leadership most important? (check one)

____ Leadership is most important during the early stages of team development when team first formed

____ Leadership is most important during the primary stage of the team's lifespan to ensure efficient functioning

____ Leadership is most important during the later stages of the team's lifespan to smooth transitions or aid in the disbanding of the team

____ Leadership is equally important at all stages of the team's lifespan

6. At what point in the activity cycle of your team is leadership most important? (check one)

____ Leadership is most important before the team engages in its primary task or activity (for planning, scheduling, practicing, etc.)

____ Leadership is most important when the team is engaged in its primary task or activity (for direction, control, guidance, etc.)

____ Leadership is most important after the team has engaged in its primary task or activity (for evaluation, review, debriefing, etc.)

____ Leadership is equally important during all phases of team activity

7. Which of the following best describes your typical week? (check one)

____ The majority of my time is spent with the team doing essentially the same tasks and functions as the other members

____ The majority of my time is spent with the team doing activities related to team leadership/leading the team

____ The majority of my time is spent away from the team doing activities related to team leadership or leading the team

____ The majority of my time is spent away from the team doing activities unrelated to the team (i.e., leading the team is not your main responsibility)

8. Please check the item that best describes the way in which team-related decisions are made in your team.

_____ Decisions are made independently by the leader; the leader has the final say as to the decisions or solutions incorporated in all team-related matters, since he or she is responsible for the outcomes.

_____ The leader(s) discusses the issue with the team and/or asks for input from the members, then selects the decision he or she feels is best.

_____ The leaders discuss the issue amongst themselves and implement their agreed upon decision.

_____ The leader(s) polls the team on each available alternative and selects or implements the decision that receives the support of the majority.

_____ Decisions are reached through consensus; all members are equal parties to decision making and the final decision reflects the agreed upon ideas of all members.

_____ Decisions are reached in an impersonal manner based on existing rules, regulations, or precedents.

_____ Decisions are handed down from outside the team.

_____ The leader(s) serves only as a moderator, smoothing the way for agreement by helping members work together effectively; decisions are left entirely up to the team members.

_____ other (please specify)_____

9. How much authority do you have to make decisions affecting the entire team? (check one)

_____ none -- all decisions about the team are joint or require approval from others

_____ some -- can make minor decisions without approval or support

_____ considerable -- can make most team-related decisions on my own but some require approval

_____ absolute -- have authority to make all team-related decisions

10. What is the basis of your power or influence over the team? In other words, what is it that causes the team members to follow you? (**check all that apply**)

____ authority provided through my designated position as team leader

____ my expertise regarding the team tasks

____ the friendship and trust that exists between me and the members

____ force; ability to coerce members into performing and punish members for non-performance

____ reward; ability to provide rewards to members for performing as desired

11. Using the scale below, indicate the impact that each of the following factors has on the effectiveness of leadership in this type of team. Ask yourself, "what impact does this have on leadership effectiveness?"

SCALE

1 = None; it's irrelevant

2 = Minor or minimal impact on leadership effectiveness

3 = Moderate impact on leadership effectiveness

4 = Major impact on leadership effectiveness

5 = Critical; it can determine the difference between success and failure

FACTORS

____ Gender of the team leader(s)

____ Race of the team leader(s)

____ Age of the team leader(s)

____ Intelligence of the team leader(s)

____ The amount of time or tenure that a team leader has with a particular team

____ The overall amount of team leadership experience possessed by the team leader(s)

____ Personality or interpersonal style of the leader(s)

____ Leadership stability -- consistency in leaders and leadership practices

12. Using the scale below, please rate the extent to which the team receives direction and leadership from each of the following sources.

SCALE

1 = This is not a source of leadership for this team

2 = The team obtains a minor degree of direction and leadership from this source

3 = The team obtains a moderate degree of direction and leadership from this source

4 = The team obtains a major degree of direction and leadership from this source

5 = This is a primary source of the team's direction and leadership. Nearly all the team's direction and leadership come from this source.

POSSIBLE SOURCES OF LEADERSHIP

____ The tasks and activities performed by the team

____ The team itself; the other members (not including a designated leader)

____ The team's overall goal, mission, or objective

____ Standard rules, regulations, and guidelines set forth in policy and procedure manuals, instruction manuals, etc.

____ A designated leader who is also a member of the team

____ A designated leader who is not actually a member of the team

____ An informal leader outside the team (i.e., someone who guides or leads the team but is not designated as team leader and/or does not have specified leadership authority)

____ An informal leader inside the team (i.e., a team member who guides or leads the team but is not designated as team leader and/or does not have specified leadership authority)

APPENDIX R

Leadership Behaviors and Tasks Form:

Study 2

LEADERSHIP BEHAVIORS AND TASKS

Directions: For each of the following behaviors and task statements indicate: 1) the extent to which it is part of the leadership activities for this team, and 2) its importance for successful leadership by checking the appropriate boxes. You should have two checkmarks for each item, one for extent of involvement and one for importance.

	Extent of Involvement				Importance			
	not part of leadership	minor	moderate	major	Not important	minor	moderate	major
1. Planning team tasks and activities	☐	☐	☐	☐	☐	☐	☐	☐
2. Stating expectations; indicating what is expected of members and what members can expect from leader	☐	☐	☐	☐	☐	☐	☐	☐
3. Scheduling team tasks and activities	☐	☐	☐	☐	☐	☐	☐	☐
4. Organizing/coordinating team tasks and activities	☐	☐	☐	☐	☐	☐	☐	☐
5. Delegating work; assigning duties	☐	☐	☐	☐	☐	☐	☐	☐
6. Prioritizing activities; setting priorities for the team and team members	☐	☐	☐	☐	☐	☐	☐	☐
7. Organizing, synthesizing, or integrating information or data	☐	☐	☐	☐	☐	☐	☐	☐
8. Analyzing or reviewing the results of team tasks and activities	☐	☐	☐	☐	☐	☐	☐	☐
9. Setting goals; stating objectives	☐	☐	☐	☐	☐	☐	☐	☐
10. Directing team performance	☐	☐	☐	☐	☐	☐	☐	☐

	Extent of Involvement				Importance			
	not part of leadership	minor	moderate	major	Not important	minor	moderate	major
11. Making team-related decisions	☐	☐	☐	☐	☐	☐	☐	☐
12. Facilitating collaborative/joint decision making among team members	☐	☐	☐	☐	☐	☐	☐	☐
13. Generating consensus/agreement on team-related matters	☐	☐	☐	☐	☐	☐	☐	☐
14. Solving team-related problems	☐	☐	☐	☐	☐	☐	☐	☐
15. Facilitating collaborative/joint problem solving among team members	☐	☐	☐	☐	☐	☐	☐	☐
16. Investigating the cause of problems	☐	☐	☐	☐	☐	☐	☐	☐
17. Monitoring team performance	☐	☐	☐	☐	☐	☐	☐	☐
18. Evaluating individual member performance	☐	☐	☐	☐	☐	☐	☐	☐
19. Evaluating overall team performance	☐	☐	☐	☐	☐	☐	☐	☐
20. Obtaining needed resources for team (tools, space, money, equipment, etc.)	☐	☐	☐	☐	☐	☐	☐	☐
21. Distributing needed resources to the team	☐	☐	☐	☐	☐	☐	☐	☐
22. Making presentations regarding team activities to individuals or groups outside the team	☐	☐	☐	☐	☐	☐	☐	☐
23. Fostering support/commitment for team activities from individuals or groups outside the team	☐	☐	☐	☐	☐	☐	☐	☐

	Extent of Involvement				Importance			
	not part of leadership	minor	moderate	major	Not important	minor	moderate	major
24. Negotiating with outsiders regarding team issues	☐	☐	☐	☐	☐	☐	☐	☐
25. Orienting new members	☐	☐	☐	☐	☐	☐	☐	☐
26. Instructing/training new members	☐	☐	☐	☐	☐	☐	☐	☐
27. Instructing/training current members	☐	☐	☐	☐	☐	☐	☐	☐
28. Coaching/advising team members	☐	☐	☐	☐	☐	☐	☐	☐
29. Conducting/directing team-related meetings	☐	☐	☐	☐	☐	☐	☐	☐
30. Attending team-related meetings	☐	☐	☐	☐	☐	☐	☐	☐
31. Supporting efforts of all members; standing behind the team	☐	☐	☐	☐	☐	☐	☐	☐
32. Counseling/consoling team members	☐	☐	☐	☐	☐	☐	☐	☐
33. Providing positive feedback to members	☐	☐	☐	☐	☐	☐	☐	☐
34. Providing negative feedback or constructive criticism to members	☐	☐	☐	☐	☐	☐	☐	☐
35. Confronting and resolving poor performance by a team member	☐	☐	☐	☐	☐	☐	☐	☐
36. Confronting and resolving poor performance by the entire team	☐	☐	☐	☐	☐	☐	☐	☐
37. Assisting or backing up members	☐	☐	☐	☐	☐	☐	☐	☐

	Extent of Involvement				Importance			
	not part of leadership	minor	moderate	major	Not important	minor	moderate	major
38. Answering members' questions	☐	☐	☐	☐	☐	☐	☐	☐
39. Listening to team members	☐	☐	☐	☐	☐	☐	☐	☐
40. Establishing norms or boundaries for acceptable team behavior	☐	☐	☐	☐	☐	☐	☐	☐
41. Rewarding individual members	☐	☐	☐	☐	☐	☐	☐	☐
42. Rewarding entire team	☐	☐	☐	☐	☐	☐	☐	☐
43. Disciplining individual members	☐	☐	☐	☐	☐	☐	☐	☐
44. Disciplining entire team	☐	☐	☐	☐	☐	☐	☐	☐
45. Getting to know members as individuals	☐	☐	☐	☐	☐	☐	☐	☐
46. Managing diversity/heterogeneity/difference among members	☐	☐	☐	☐	☐	☐	☐	☐
47. Managing interpersonal conflicts	☐	☐	☐	☐	☐	☐	☐	☐
48. Modeling effective teamwork behaviors; serving as a role model for members	☐	☐	☐	☐	☐	☐	☐	☐
49. Engaging the team in organizational activities	☐	☐	☐	☐	☐	☐	☐	☐
50. Establishing/defining clear & specific team boundaries; distinguishing between team and non-team activities, functions, and issues	☐	☐	☐	☐	☐	☐	☐	☐
51. Managing boundaries; protecting the team from outside influences	☐	☐	☐	☐	☐	☐	☐	☐

	Extent of Involvement				Importance			
	not part of leadership	minor	moderate	major	Not important	minor	moderate	major
52. Taking personal responsibility for outcomes	☐	☐	☐	☐	☐	☐	☐	☐
53. Holding members responsible/accountable for outcomes	☐	☐	☐	☐	☐	☐	☐	☐
54. Facilitating shared leadership; developing leadership in all members	☐	☐	☐	☐	☐	☐	☐	☐
55. Structuring, designing, or building the team; creating and filling roles and positions	☐	☐	☐	☐	☐	☐	☐	☐
56. Justifying or explaining actions and decisions to members	☐	☐	☐	☐	☐	☐	☐	☐
57. Motivating/inspiring members to perform and perform well	☐	☐	☐	☐	☐	☐	☐	☐
58. Creating change; removing barriers to goals	☐	☐	☐	☐	☐	☐	☐	☐
59. Participating directly in team activities	☐	☐	☐	☐	☐	☐	☐	☐
60. Reassigning or adjusting the activities of individual members to ensure goals will be met	☐	☐	☐	☐	☐	☐	☐	☐
61. Anticipating and planning for crisis situations; preparing the team for such crises	☐	☐	☐	☐	☐	☐	☐	☐
62. Strategic thinking; developing strategies	☐	☐	☐	☐	☐	☐	☐	☐

	Extent of Involvement				Importance			
	not part of leadership	minor	moderate	major	Not important	minor	moderate	major
63. Providing members with relevant information	☐	☐	☐	☐	☐	☐	☐	☐
64. Fostering team morale and team spirit	☐	☐	☐	☐	☐	☐	☐	☐
65. Fostering team commitment and loyalty; ensuring members are committed to the team	☐	☐	☐	☐	☐	☐	☐	☐
66. Emphasizing working towards a common goal	☐	☐	☐	☐	☐	☐	☐	☐
67. Building or inspiring trust in the team and mutual respect among members	☐	☐	☐	☐	☐	☐	☐	☐
68. Challenging members to expand their skills and abilities; presenting challenging opportunities	☐	☐	☐	☐	☐	☐	☐	☐
69. Multi-tasking; performing multiple functions simultaneously	☐	☐	☐	☐	☐	☐	☐	☐
70. Scanning an uncertain environment for info.	☐	☐	☐	☐	☐	☐	☐	☐

APPENDIX S

KSAO Card Sort:

Study 2

KSAO Card Sort

For this task you should consider all teams of this type rather than just your team. Please sort each of the following knowledge, skills, abilities, and other characteristics into the response category you believe best represents the importance of that item for successful team leadership. As you go through the cards, ask yourself "How important is this for effective leadership in this type of team?" The categories are:

1 = Unimportant, not necessary for successful leadership

2 = Relevant, may be helpful but is not essential for success

3 = Moderately Important, has some impact on leadership success

4 = Very Important, has a strong impact on leadership success

5 = Critical, essential for successful leadership

____ Interpersonal skills

____ Oral communication skills

____ Written communication skills

____ Planning and organizing skills

____ Problem-solving skills

____ Creativity and innovation

____ Flexibility and open-mindedness to new ideas and information

____ Ability to perform all team tasks and functions

____ Skill, talent, or expertise in performing the team tasks; being an expert in each team position

____ Conflict management and conflict resolution skills

____ Project management skills

____ Teamwork process management skills

____ Decision-making skills

____ Cognitive or thinking skills

____ Abstract reasoning ability

____ Continual learning

____ Knowledge or understanding of teamwork and team performance concepts

____ Knowledge or understanding of all team tasks

____ Knowledge or understanding of the operations and activities performed by each individual team member

____ Ability to handle crises, trauma, or life/death situations

____ Personal commitment to the team's goal

____ Previous leadership experience

____ Previous team leadership experience (regardless of team type)

____ Previous experience as a member of a team (regardless of team type)

____ Previous experience as a member of this type of team

____ Previous experience as a leader of this type of team

____ Leadership ability

____ Tolerance for ambiguity or uncertainty

____ Personal commitment to the team and team members

____ Charisma; ability to obtain devotion & loyalty from members

____ Sensitivity; concern for others

____ Being friendly and approachable to all members

____ Being a member of the team as well as the leader

____ Relating to and treating members as equals rather than subordinates

____ Being caring, considerate, and understanding of members feelings

____ Fairness and impartiality toward all members

____ Patience and self-control

APPENDIX T

LBDQ for Team Leadership:

Study 2

LBDQ for Team Leadership

For this task, you should consider all teams of this type rather than just your specific team. Please indicate the extent to which the leader of this type of team engages in the following activities by sorting the activity cards into the appropriate response category. As you go through the cards, ask yourself "To what extent do leaders of this type of team do this activity?" The categories are:

1	2	3	4	5
Never	Seldom	Occasionally	Often	Always

(representation)

____ Act as the spokesperson for the team

____ Speak as the representative of the team

____ Speak for the team when visitors are present

____ Represent the team at outside meetings

____ Serve as the go-between or liaison between the team and higher-ups

(initiating structure)

____ Let the team know what is expected of them

____ Encourage the use of uniform procedures

____ Try out new ideas in the team

____ Make their attitudes clear to the team

____ Decide what should be done and how it will be done

____ Assign team members to particular tasks

____ Make sure that their part in the team is understood by the members

____ Schedule the work to be done

____ Maintain definite standards of performance

____ Ask that team members follow standard rules and regulations

____ Emphasize meeting deadlines

____ Meet with the team at regularly scheduled times

____ Develop and set strategies for the team to follow

(tolerance of freedom)

____ Allow the members complete freedom in their work

____ Permit the members to use their own judgement in solving problems

____ Encourage initiative in the team members

____ Let the members do the work the way they think best

____ Assign a task, then let the team members handle it

____ Turn the members loose on a job, and let them go to it

____ Allow the team a high degree of initiative

____ Trust members to exercise good judgment

____ Permit the team to set its own pace

____ Give members the freedom and responsibility to operate with little or no supervision

(role assumption)

____ Show reluctance about taking initiative in the team (R)

____ Fail to take necessary action (R)

____ Let others take away their leadership in the team (R)

____ Let members take advantage of them (R)

____ Serve as leader of the team in name only (i.e., serve as a figure-head) (R)

____ Back down to others rather than standing firm (R)

____ Let others have authority that they should keep (R)

____ Overcome attempts made to challenge their leadership

____ Take an active leadership role in the team

____ Take control of the situation when problems develop

____ Show a willingness to lead

____ Take charge if emergencies arise

(integration)

____ Keep the members working together as a team

____ Settle conflicts when they occur in the team

____ See to it that work of the team is coordinated

____ Help team members settle their differences

____ Maintain a closely knit team

____ Foster team unity and cohesion

____ Encourage interaction among members

(consideration)

____ Do little things to make it pleasant to be a member of the team

____ Put suggestions made by the team into operation

____ Treat team members as equals rather than subordinates

____ Give advanced warning of changes whenever possible

____ Keep to themselves (R)

____ Look out for the personal welfare of the team members

____ Refuse to explain their actions (R)

____ Act without consulting the team (R)

____ Insist that everything be done their way (R)

____ Discuss important matters with the team before acting

____ Remain sensitive to the needs and concerns of all members

____ Interact socially with members of the team

Transformational Leadership

(charismatic leadership)

____ Convey a sense of purpose or mission to the members

____ Inspire complete faith and loyalty from the members

____ Motivate members to achieve difficult goals

____ Get members to surpass their own individual needs for the sake of the team

(intellectual stimulation)

____ Encourage members to look at every situation from new and different perspectives

____ Prompt members to think

____ Stimulate members intellectually

____ Encourage creativity and innovation in all members

(individualized consideration)

____ Recognize and encourage the unique potential and abilities in each team member

____ Delegate challenging work

____ Increase member responsibility

____ Keep members informed of relevant events

____ Act as a mentor to the team members

____ Put the team's welfare above the welfare of any member in it (R)

APPENDIX U

Leader Involvement Card Sort:

Study 2

Leader Involvement Card Sort

For this task you should again consider all teams of this type rather than just your team. Please answer the questions printed on the cards by placing each card in the response category that best answers that particular question. The response categories are:

1 = Not at all; never

2 = To a minor degree; to a minimal extent; rarely; seldom

3 = To a moderate degree; to some extent; sometimes; occasionally

4 = To a high degree; to a great extent; frequently; often

5 = Completely; entirely; always

____ To what extent does the team determine its own workload, rather than having the work assigned or delegated by the team leader?

____ To what extent does the team determine its own methods and procedures for completing the work?

____ To what extent does the team determine the roles to be filled by each member, rather than being assigned roles by the team leader?

____ To what extent does the team determine its own schedule for completing the work?

____ To what extent does the team monitor and manage its own performance?

____ To what extent is the team self-directed rather than being directed or led by a designated leader?

____ To what extent is decision making shared among all members?

____ ____ To what extent does the leader perform the same basic activities and functions as the other team members?

____ ____ To what extent is the leader actually involved with the team or in team activities?

____ ____ To what extent does the leader simply oversee the operations of the team without being directly involved in contributing to the team's output? (R)

____ ____ To what extent does the leader work side-by-side with team members?

____ ____ To what extent does the leader supervise, rather than participate in, team activities? (R)

____ ____ To what extent is the leader considered "just another member of the team?"

____ ____ To what extent is the leader an expert in each of the team positions?

____ ____ To what extent does the leader **allow** team members to freely advance their opinions, ideas, and concerns?

____ ____ To what extent does the leader **encourage** team members to freely advance their opinions, ideas, and concerns?

____ ____ To what extent is the leader open or receptive to input from team members?

____ ____ To what extent does the leader actively seek or ask for members' opinions, ideas, and concerns?

____ ____ To what extent does the leader encourage open communication among all members?

____ ____ To what extent does the leader work to **prevent** potential problems in the team rather than solve problems as they arise?

____ ____ To what extent is the leader responsible for the training of the team members?

____ ____ To what extent does the leader provide technical, task- specific training to the team members?

____ ____ To what extent does the leader provide team skills or teamwork training to the team members?

____ ____ To what extent has the leader been trained about effective teamwork or effective team skills?

____ ____ To what extent is the leader responsible for setting the goals, objectives, or mission of the team?

____ To what extent is the team responsible for setting its own goals?

____ To what extent does the nature of the team task determine the team's goal?

____ ____ To what extent is **the leader** responsible for ensuring that the team completes its task, mission, or project?

____ ____ To what extent is **the leader** held accountable for the quality of the team's outcomes?

____ To what extent is **the team** responsible for ensuring that it completes its own task, mission, or project?

____ To what extent is **the team** held accountable for the quality of its own outcomes?

____ ____ To what extent does **the leader** review the quality of the team's output?

____ To what extent is **the team** responsible for reviewing the quality of its own results?

____ ____ To what extent is **the leader** held accountable for problems that occur in the team?

____ ____ To what extent is **the leader** responsible for solving the problems that occur in the team?

APPENDIX V

Content Coding Keys for the Team Leadership Interview and Team Leadership Questionnaire

Interview Coding Key

Subject Number (SUBJNUM)

001 - 100

Respondent Role (SUBJROLE)

1 = Leader
2 = Member

Respondent Involvement (NOWTHEN)

1 = Present
2 = Past

Respondent age (TLQ) (AGE)

in years

Respondent race (TLQ) (RACE)

1 = white
2 = black
3 = hispanic
4 = asian
5 = other

Respondent gender (TLQ) (SEX)

1 = male
2 = female

Respondent time in role (TLQ) (TIME)

in months

Relative time in role (TLQ) (TIMERLTV)

1 - 4 (short to long)

Functional Team Type (TEAMNAME)

01 = Automotive Service Team
02 = Interdepartmental Cross-Functional Training Team
03 = Manufacturing Department/Team (various)
04 = Cost Engineering/Cost Down Team
05 = Manuf Eng Ergonomic Design Team/ H.F. project team
06 = Remanufacturing/Reassembly Team
07 = Planning department of a Manufacturing Org.
08 = Process Management Team for Health Care Org.
09 = Interdprtmntl Cross-Functional Work Team (pub.)
10 = Navy Combat Systems Training Team
11 = Project Planning Committee in a Manuf. Org.
12 = Navy Tactical Warfare Team
13 = Quality/Process Improvement Team (VNG, NNSB, City)
14 = Navy COMSUBLANT Message Center team
15 = Self-Funded Designated Service Unit (Health Care)
16 = Aircraft cockpit crew
17 = Fire Department Engine, Truck, or Ladder Company
18 = Interdepartmental committee/project team
19 = City League Soccer team/college soccer team
20 = Rec League Volleyball team
21 = Productivity Committee
22 = Fire Department inspection and investigation team
23 = Volunteer Emergency Rescue Squad/ALS team
24 = Hazardous Materials (HAZMAT) team
25 = FPA OSH team
26 = Sheriff's Office Emergency Response Team (S.E.R.T)
27 = Training Advisory Committee for Sheriff's Office
28 = Fire Battalion
29 = Building Inspections team (new, commercial, existing structures) for City of Norfolk
30 = Operations/Inspections Bureau for City of Norfolk
31 = Emergency Grant Program "team" for City of Norfolk
33 = SWEEPS team for Norfolk (clean-up project)
34 = Office Assistants team
35 = Technical Rescue Team VBFD
36 = Women's Lacrosse (ODU)
37 = Boat team/surf-rescue squad
38 = Dive team (ODU)
39 = Natural Gas Construction Crew
40 = Acting cast/ensemble
41 = Administrative team-Chesapeake Beach Volunteer EMS
42 = Emergency Dive team
43 = College Basketball team
44 = Singing/Musical group/ensemble
45 = ODU Golf team
46 = Church Softball team
47 = Women's field hockey
48 = H.S. Football team

Teamness Index Scores (TI1--TI12; 12 items; 1-5 scale)

Leader Title (LDR1NAME - LDR*N*NAME)

00 = N/A
01 = Coach/Head Coach
02 = Assistant Coach
03 = Captain
04 = Co-Captain
05 = Instructor
06 = Manager
07 = Lead
08 = Supervisor
09 = Sponsor
10 = Trainer
11 = Squad Leader
12 = Lieutenant
13 = Platoon Sergeant
14 = Team/Crew Leader
15 = Facilitator
16 = Coordinator
17 = Advisor
18 = XO (Executive Officer)
19 = Watch Officer
20 = Director
21 = Senior Member
22 = Assistant Director
23 = Battalion Commander
24 = Battalion Chief
25 = Area Leader
26 = Senior Team Leader
27 = Pilot in Command
28 = Chairperson
29 = Commander (Squad, SERT, EMS)
30 = EMS-5 or EMS rep
31 = AIC (Attendant in Charge)
32 = Sheriff/Deputy
33 = Second in Command/Assistant Commander
34 = President
35 = Vice President
36 = District/Deputy Fire Chief
37 = Chief
99 = No title, informal leader, or member-specialist position

Number of leaders (NUMOFLDR)

0 - N

Leader Role (LDRROLE)

1 = Leader Only
2 = Majority are Leaders only
3 = Even split
4 = Majority are Leader-members
5 = Leader-member

Number of teams led (NUMTML1 - NUMTML*N*)

0 = N/A
1 - N

Power of leaders (POWER)

0 = N/A
1 = equal
2 = majority equal but minority has more/less power
3 = majority unequal but minority have equal power
4 = unequal

Team size (SIZE)

1 = 2 members
2 = 3-5
3 = 6-10
4 = 11-15
5 = 16-20
6 = 21-25
7 = 26-30
8 = 31-35
9 = 36+

Member prior to leader? (MEMBR1ST)

1 = no
2 = Majority were not members first
3 = Even split or was member of another team before becoming leader of this one
4 = Majority were members first
5 = yes

Leader environment (LDRLOCAL)

1 = almost always same as team
2 = majority operate in same environment
others operate predominantly elsewhere
3 = even split or varies widely
4 = majority operate in separate environment
others operate predominantly with team
5 = generally separate/away from team

How became leader? (SELECTL1 - SELECTL*N*)

00 = N/A
01 = appointed by a superior
02 = selected or hired as in any other job
03 = self-appointed or self-designated leader
04 = elected by team (gen. based on skill/experience)
05 = elected by outsiders (gen. based on skill/tenure)
06 = based solely on experience or seniority
07 = based solely on expertise/skill
08 = combination of experience and expertise
09 = by passing a test/training course, getting licensed/certified
10 = by volunteering, requesting, or asking for it (with approval)
11 = by being promoted from member for good perf.
12 = trying out or competing for it and winning competition
13 = by request; being asked to lead by member or superior
14 = combination of 4 and 5
15 = filling in for or replacing normal leader based on background
16 = 13 + training & passing training course
17 = 14 + training and certification
18 = 06 + elected by outsiders or superior
19 = 09 + 12 (with rank)
20 = 05 + 09/14
21 = 12 + winning tryout
22 = 12 + 13
23 = 01 + 04
24 = 14 + 06 + wining tryout
25 = 05 + 12 + 08
26 = part of job duties
27 = 9, 10, 11

Task Structure vs. Managing Interactions (TSVSMI)

1 = structuring tasks
2 = split but majority spend most time structuring
3 = equal or majority equal or even split
4 = split but majority spend most time on interactions
5 = managing interactions

Most important factor distinguishing effective and ineffective leadership? (MOSTIMPT)

ATTITUDES/PERSONAL CHARACTERISTICS

10 = perseverance and commitment to team goal; self-motivation

11 = willingness to listen to members; accept input rather than push own agenda

14 = fairness, honesty, trust

15 = credibility; mutual trust and respect; having members trust and respect decisions and abilities

17 = lead by example; be a role model (maintain positive attitude)

GENERAL SKILLS

20 = communication skills -- openness/clarity

21 = interpersonal/interaction skills

22 = decision-making skills

23 = organizational skills/being organized

25 = ability to understand and work with/around individual member motivations/personalities; know members strengths/weaknesses

29 = being receptive and open to all available info. while being decisive in decision making

TASK SPECIFIC SKILLS

30 = expertise in or knowledge of the team task(s)

39 = attention to detail

ACTION/BEHAVIOR

50 = balancing autonomy/freedom of action with proper guidance and support; providing high levels of autonomy

51 = proactive rather than reactive to problems and situations (lead by example)

52 = serving as both a leader and active member of the team (lead by example, mutual respect, treat members as equals)

53 = sharing leadership/relinquishing control as needed; empowering members

54 = teambuilding; ability to get diverse members to act as a team

55 = balancing multiple leader roles

56 = filling the requirements of the role and meeting member's needs; keeping members happy; getting job done

57 = facilitating, fostering, or bringing the team to consensus

58 = understand and focus on team goal; goal focused; establishing goal and monitoring progress toward it; keep momentum up, motivate to work for goal

59 = maintaining discipline and control

60 = providing constructive criticism and frequent feedback

Building Trust (TRUSTBLG)

1 = no (if it develops it is through experience rather than intervention)
2 = efforts are indirect/unconscious (atmosphere of trust)
3 = most don't but some do or efforts are general or related to leader member trust
4 = most do but some don't
5 = yes

Covering for leader when absent (LDRHELP1 - LDRHELP*N*)

0 = N/A
1 = all team members pitch in
2 = a team member would assume or be assigned duties
3 = leader's superior would assume duties
4 = co-leader(s) would assume duties
5 = team would do without leadership
6 = team would stop functioning until leader returned
7 = 2 or 8
8 = outsider fills in (possibly equal or higher position in other team)
9 = 4 or 8
10 = 4 or 6
11 = 4, 6, or 8
12 = 1 or 8
13 = 2 or 4
14 = 2, 4, or 8
15 = 5 or 8
16 = 4 or 5

When can team member be team leader? (TAKEOVER)

01 = never
02 = whenever the team leader is absent or unavailable
03 = when a team issue arises in the member's area of expertise
04 = when designated or assigned by the team leader
05 = when designated or assigned by someone outside the team at a higher level (e.g., the team leader's superior)
06 = for special projects
07 = 02 & 04
08 = When leader in error or incompetent
09 = 02, 03, 04, 05, & 08
10 = 02 & 03
11 = 10 & 08
12 = 04 & 06
13 = 02 & 08
14 = 02 & whenever they feel comfortable and want to
15 = whenever they wanted or considered it appropriate
16 = 04 & 14
17 = 02, 04, & 08
18 = 02 & 06
19 = 02, 03, & 06
20 = 02, 04, & 06
21 = 02, 03, & 04
22 = 02, 03, & 08
23 = 03, 04, & 06
24 = 02, 03, 04, & 06
25 = when team is engaged in its primary activity

Physical requirements for leading (PHYSREQ)

1 = no
2 = for some leaders but not all
3 = yes

Same phys reqs as rest of team? (SAMEREQ)

1 = no, (unique, fewer, or more)
2 = most have different, others same
3 = most have same, others different
4 = yes, same requirements

Different phys reqs for different leaders (DIFREQ)

0 = N/A
1 = no, all the same
2 = yes, majority have same but others differ
3 = yes, majority have different reqs but others same
4 = yes, all have different requirements

Mental vs. physical (MENTAL)

1 = physical
2 = split but majority spend most time on physical
3 = equal or majority equal or even split
4 = split but majority spend most time on mental
5 = mental

Quick decisions vs. careful reasoning (QWIKDEC)

1 = quick
2 = split but majority make quick
3 = equal or majority equal or even split
4 = split but majority make careful/deep
5 = deep thought

Short-term vs long-term planning (PLANING)

1 = short-term
2 = split but majority make short-term
3 = equal or majority equal or even split
4 = split but majority make long-term
5 = long-term

Complex vs. simple problems (PROBLEM)

1 = simple
2 = split but majority deal with simple
3 = equal or majority equal or even split
4 = split but majority deal with complex
5 = complex

Is it mentally challenging? (CHALLENG)

1 = no
2 = yes

Educational requirements (EDUREQ1 - EDUREQ*N*)

1 = there are none
2 = high school diploma
3 = two year associates or technical degree
4 = specialized training or education related to the team's task
5 = specialized certificate or license (gained through #4--specialized training or education)
6 = four year college degree (B.A., B.S., certified teacher)
7 = master's degree
8 = 2 & 4
9 = 2 & 5
10 = 4 & 6
11 = 5 & 6
12 = 5 & 7
13 = student in good academic standing
14 = PhD

Training by leaders (TRAINER)

1 = no
2 = majority don't but some do
3 = even split or supports training, provides educ resources, provides updates, shares information
4 = majority do but some don't
5 = yes

Type of training (TRAINING)

0 = N/A
1 = task/technical
2 = split but majority focus on task/technical
3 = both task and teamwork or even split
4 = split but majority focus on teamwork
5 = teamwork

Training for leaders (TRAINED)

1 = no
2 = yes, but not related to this team or organization
3 = yes, general
4 = yes, thorough

Control comms. among members (COMMCTRL)

1 = no
2 = split but majority do not
3 = even split or done occasionally
4 = split but majority do
5 = yes

Means of communication (COMTYPE1 - COMTYPE*N*)

1 = face-to-face, one-on-one
2 = telephone
3 = memo, letter, written report, posting
4 = team meeting
5 = hand signals
6 = equal 1 & 4
7 = equal 2 & 4
8 = equal 1 & 3
9 = equal 3 & 4
10 = computer/e-mail
11 = radio, walkie talkie, intercom, pager
12 = through team leader/liaison
13 = equal 1 & 2
14 = equal 4 & 12
15 = equal 11 & 5
16 = equal 1, 2, & 3
17 = equal 1 & 11
18 = equal 1, 4, & 10
19 = equal 2 & 10
20 = equal 1, 3, 4
21 = equal 2, 4, 10
22 = equal 10 & 12
23 = equal 3, 10, 12
24 = varies among multiple forms 1, 2, 3, 4, 10, 12
25 = 3 & 11
26 = 2 & 12
27 = 11 & 12

Announce and explain plans (EXPLAIN)

1 = no
2 = split but majority do not
3 = even split or done occasionally
4 = split but majority do
5 = yes

Evaluate team's performance (EVALS)

1 = no
2 = split but majority do not
3 = even split
4 = split but majority do
5 = yes

Formal, Informal, or Both? (EVALTYPE)

0 = N/A
1 = formal
2 = split but majority formal
3 = both or even split or majority both
4 = split but majority informal
5 = informal

Team vs. individual focus (EVALFOCS)

0 = N/A
1 = overall team
2 = split but majority overall team
3 = both or even split or majority both
4 = split but majority individual
5 = individual

Reward individuals (INDVREC)

1 = no
2 = split but majority do not
3 = even split
4 = split but majority do
5 = yes

Types of individual rewards (MBRGIFT1 - MBRGIFT*N*)

1 = no 2 = yes

____ praise
____ monetary bonus
____ pay raise
____ awards
____ gifts
____ time off, comp time, vacation time
____ meals
____ ceremonies; parties
____ new assignments, added responsibility, promotions
____ reduced workload
____ other

Different individual rewards from diff. leaders? (SAMEIG)

0 = N/A
1 = no, same
2 = yes, slight differences
3 = yes, different (often due to position power)

Reward team as a whole (TEAMREC)

1 = no
2 = split but majority do not
3 = even split
4 = split but majority do
5 = yes

Types of team rewards (TMGIFT1 - TMGIFT*N*)

1 = no 2 = yes

____ praise
____ monetary bonus
____ pay raise
____ awards
____ gifts
____ time off, comp time, vacation time
____ meals
____ ceremonies; parties
____ new assignments, added responsibility, promotions
____ reduced workload
____ other

Different team rewards from different leaders? (SAMETG)

0 = N/A
1 = no, same
2 = yes, slight differences
3 = yes, different (often due to position power)

Team vs. task skills (SKILLS)

1 = team skills most important
2 = equal
3 = task skills most important

Reward team or members more? (PERFREC)

0 = N/A neither
1 = team performance most
2 = split but majority focus most on team
3 = both equally or majority equal or even split
4 = split but majority focus most on members
5 = individual performance most

Punish poor performance? (PUNISH)

1 = no
2 = split but majority do not
3 = even split
4 = split but majority do
5 = yes

Punish entire team or only member (PUNSHWHO)

0 = N/A
1 = entire team
2 = split but majority punish entire team
3 = both or majority both or even split
4 = split but majority punish specific member
5 = specific member

Types of punishments (PNSHMT1 - PNSHMTN)

1 = no 2 = yes (for each)

verbal reprimand to team

verbal reprimand to member

dock pay

suspend member from participating in team activities for a certain period of time

remove the member from the team

official reprimand in member's personnel file

requiring extra work or extra time to correct problem

have a developmental discussion with the member rather than disciplining member per se

have a developmental discussion with the entire team rather than disciplining member per se

reassign member to a new position, change member's job duties

withhold rewards or take back rewards

require extra work or time as punishment (e.g., longer/harder practice, running laps)

OTHER

Different punishments from diff. leaders? (PUNHOW)

0 = N/A
1 = no, same
2 = yes, slight differences
3 = yes, different (often due to position power)

Set goals (SETGOALS)

1 = no
2 = split but majority do not
3 = even split or participated in team goal setting
4 = split but majority do
5 = yes

Specific vs. general goals (GOALSPEC)

0 = N/A
1 = specific
2 = split but majority set specific goals
3 = even split or majority both or both equally
4 = split but majority set broad/general goals
5 = general

Challenging vs. easy goals? (GOALEASE)

0 = N/A
1 = challenging
2 = split but majority set challenging goals
3 = even split or majority both or both equally
4 = split but majority set easy goals
5 = easy

Keep team focused on task? (FOCUSED)

1 = no
2 = split but majority do not
3 = even split
4 = split but majority do
5 = yes

Need leader? (NEEDLDR)

1 = no
2 = yes

When? (WHENNEED)

1 = no, team always needed leadership to be effective
2 = yes, team could be effective doing routine tasks on its own but not during crises
3 = yes, on simple tasks but not complex tasks
4 = yes, during short periods or limited work cycles
5 = once team becomes more experienced or seasoned
6 = 2, 3 & 4
7 = Practice but not performance
8 = Performance but not practice
9 = 2, 7, & 8
10 = 3 & 5
11 = 2 & 3
12 = individual tasks but not coordinated teamwork

If no, when could the team function effectively without leadership?

0 = always, they didn't need leadership to be effective
2 = team could be effective doing routine tasks that they are familiar with
3 = on simple tasks but not complex tasks
4 = for short periods or limited work cycles
5 = once team becomes more experienced or seasoned
6 = 2, 3 & 4
7 = Practice but not performance
8 = Performance but not practice
9 = 2, 7, & 8
10 = 3 & 5
11 = 2 & 3
12 = individual tasks but not coordinated teamwork
13 = can perform task effectively; just need someone to fill leader role for administrative reasons

Questionnaire Coding Key

Item 1 (STABLE)

1 - 4

Item 2 (STYLE)

1 = 7-8 * (authoritative, task oriented)
2 = 5-6 *
3 = 4 * split (balanced)
4 = 2-3 *
5 = 0-1 * (democratic, people oriented)

authoritative/autocratic *
democratic

hands-on
hands-off *

directive *
participative

process-oriented
outcome-oriented *

task-oriented *
people-oriented

friendly & approachable
reserved & distant *

structured *
considerate

formal *
informal/casual

Item 3 (TEAMTYPE)

1 - 4

Item 4 (LDRTOALL)

1 = no
2 = unsure
3 = yes

Item 4a (WHYNOTLD)

0 = N/A
1 - 6

Item 5 (LIFESPAN)

1 - 4

Item 6 (ACTIVITY)

1 - 4

Item 7 (WORKWEEK)

1 - 4

Item 8 (DECISION)

1 - 9 (n)

Item 9 (LDRDMPWR)

1 - 4

Item 10a (POWER1)

1 = no 2 = yes

Item 10b (POWER2)

1 = no 2 = yes

Item 10c (POWER3)

1 = no 2 = yes

Item 10d (POWER4)

1 = no 2 = yes

Item 10e (POWER5)

1 = no 2 = yes

Item 11a	1 - 5	(SEXIMPT)
Item 11b	1 - 5	(RACEIMPT)
Item 11c	1 - 5	(AGEIMPT)
Item 11d	1 - 5	(IQIMPT)
Item 11e	1 - 5	(TIMEIMPT)
Item 11f	1 - 5	(EXPRIMPT)
Item 11g	1 - 5	(PERSNLTY)
Item 11h	1 - 5	(STBLIMPT)
Item 12a	1 - 5	(TASKLDR)
Item 12b	1 - 5	(TMLDR)
Item 12c	1 - 5	(GOALSLDR)
Item 12d	1 - 5	(RULESLDR)
Item 12e	1 - 5	(FRMLIN)
Item 12f	1 - 5	(FRMLOUT)
Item 12g	1 - 5	(INFRMOUT)
Item 12h	1 - 5	(INFRMIN)

APPENDIX W

Results of LISREL VIII Confirmatory Factor Analysis:

KSAO Card Sort

Table W1

KSAO Factor 1 (Interpersonal & Interactive KSAOs): Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	.52	.73	.27
Item 2	.32	.90	.10
Item 3	.40	.84	.16
Item 4	.34	.88	.12
Item 5	.59	.65	.35
Item 6	.43	.81	.19
Item 7	.47	.77	.23
Item 8	.47	.78	.22
Item 9	.44	.81	.19
Item 10	.36	.87	.13
Item 11	.49	.76	.24
Item 12	.49	.76	.24
Item 13	.70	.51	.49
Item 14	.56	.69	.31
Item 15	.30	.91	.09
Item 16	.69	.52	.48
Item 17	.57	.67	.33
Item 18	.60	.64	.36

Note. Lambda X = factor loadings. Theta Delta = measurement error variances. R^2 = item reliabilities. Goodness-of-fit indices are: χ^2 (df = 135, $p<.01$) = 232.45; GFI = .80; CIF = .76; NNFI = .73; and RMSEA = .08. All T-values for structural coefficients (i.e., Lambda X) are statistically significant ($p<.05$).

Table W2

KSAO Factor 2 (Process Management): Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	.41	.83	.17
Item 2	.53	.72	.28
Item 3	.34	.88	.12
Item 4	.71	.50	.50
Item 5	.76	.42	.58
Item 6	.62	.61	.39
Item 7	.42	.82	.18
Item 8	.45	.80	.20
Item 9	.73	.46	.54
Item 10	.74	.45	.55
Item 11	.52	.73	.27

Note. Lambda X = factor loadings. Theta Delta = measurement error variances. R^2 = item reliabilities. Goodness-of-fit indices are: χ^2 (df = 44, $p<.01$) = 169.31; GFI = .74; CFI = .69; NNFI = .61; and RMSEA= .17. All T-values for structural coefficients (i.e., Lambda X) are statistically significant ($p<.05$).

Table W3

KSAO Factor 3 (Experience): Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	.92	.15	.85
Item 2	.90	.19	.81
Item 3	.66	.56	.44
Item 4	.63	.61	.39
Item 5	.65	.58	.42

Note. Lambda X = factor loadings. Theta Delta = measurement error variances. R^2 = item reliabilities. Goodness-of-fit indices are: χ^2 (df = 5, p<.01) = 56.34; GFI = .80; CFI = .83; NNFI = .66; and RMSEA = .32. All T-values for structural coefficients (i.e., Lambda X) are statistically significant (p<.05).

APPENDIX X

Results of LISREL VIII Confirmatory Factor Analysis:

Leader Involvement Card Sort

Table X1

LI Factor 1 (Leader Responsibilities): Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	.58	.67	.33
Item 2	.41	.83	.17
Item 3	.86	.26	.74
Item 4	.88	.22	.78
Item 5	.82	.32	.68
Item 6	.49	.76	.24
Item 7	.64	.59	.41
Item 8	.53	.72	.28
Item 9	.58	.66	.34
Item 10	.64	.59	.41

Note. Lambda X = factor loadings. Theta Delta = measurement error variances. R^2 = item reliabilities. Goodness-of-fit indices are: χ^2 (df = 35, p<.01) = 138.51; GFI = .74; CFI = .79; NNFI = .73; and RMSEA = .17. All T-values for structural coefficients (i.e., Lambda X) are statistically significant (p<.05).

Table X2

LI Factor 2 (Self-Direction): Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	.81	.35	.65
Item 2	.80	.35	.65
Item 3	.75	.43	.57
Item 4	.71	.49	.51
Item 5	.61	.63	.37
Item 6	.63	.60	.40
Item 7	.52	.73	.27

Note. Lambda X = factor loadings. Theta Delta = measurement error variances. R^2 = item reliabilities. Goodness-of-fit indices are: χ^2 (df = 14, p>.01, ns) = 25.99; GFI = .93; CFI = .96; NNFI = .94; and RMSEA = .09. All T-values for structural coefficients (i.e., Lambda X) are statistically significant (p<.05).

Table X3

LI Factor 3 (Openness): Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	.95	.09	.91
Item 2	.90	.19	.81
Item 3	.70	.50	.50
Item 4	.71	.50	.50
Item 5	.56	.69	.31

Note. Lambda X = factor loadings. Theta Delta = measurement error variances. R^2 = item reliabilities. Goodness-of-fit indices are: χ^2 (df = 5, p<.01) = 35.73; GFI = .88; CFI = .90; NNFI = .81; and RMSEA = .25. All T-values for structural coefficients (i.e., Lambda X) are statistically significant (p<.05).

Table X4

LI Factor 4 (Leader Involvement with Team): Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	.87	.24	.76
Item 2	.57	.67	.33
Item 3	.67	.55	.45
Item 4	.80	.37	.63
Item 5	.62	.62	.38
Item 6	.56	.69	.31

Note. Lambda X = factor loadings. Theta Delta = measurement error variances. R^2 = item reliabilities. Goodness-of-fit indices are: χ^2 (df = 9, p<.01) = 48.48; GFI = .87; CFI = .84; NNFI = .73; and RMSEA = .21. All T-values for structural coefficients (i.e., Lambda X) are statistically significant (p<.05).

Table X5

LI Factor 5 (Team Member Responsibilities): Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	.71	.50	.50
Item 2	.90	.18	.82
Item 3	.54	.71	.29

Note. Lambda X = factor loadings. Theta Delta = measurement error variances. R^2 = item reliabilities. Goodness-of-fit indices cannot be calculated due to zero degrees of freedom. All T-values for structural coefficients (i.e., Lambda X) are statistically significant ($p<.05$).

APPENDIX Y

Results of LISREL VIII Confirmatory Factor Analysis:

Leadership Behaviors and Tasks Form

Table Y1

LBT Factor 1 (Process Management & Guidance to Goals): Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	.53	.72	.28
Item 2	.52	.73	.27
Item 3	.62	.62	.38
Item 4	.58	.66	.34
Item 5	.78	.39	.61
Item 6	.62	.61	.39
Item 7	.59	.65	.35
Item 8	.61	.63	.37
Item 9	.64	.58	.42
Item 10	.46	.79	.21
Item 11	.74	.45	.55
Item 12	.73	.46	.54
Item 13	.87	.24	.76
Item 14	.79	.38	.62
Item 15	.51	.74	.26
Item 16	.64	.60	.40
Item 17	.79	.37	.63
Item 18	.69	.53	.47
Item 19	.51	.74	.26
Item 20	.53	.72	.28
Item 21	.51	.74	.26
Item 22	.61	.63	.37
Item 23	.53	.71	.29

Note. Lambda X = factor loadings. Theta Delta = measurement error variances. R^2 = item reliabilities. Goodness-of-fit indices are: χ^2 (df = 230, p<.01) = 532.86; GFI = .69; CFI = .76; NNFI = .73; and RMSEA = .12. All T-values for structural coefficients (i.e., Lambda X) are statistically significant (p<.05).

Table Y2

LBT Factor 2 (Team Building & Motivation): Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	.49	.76	.24
Item 2	.66	.57	.43
Item 3	.46	.79	.21
Item 4	.45	.80	.20
Item 5	.53	.72	.28
Item 6	.58	.66	.34
Item 7	.55	.70	.30
Item 8	.62	.62	.38
Item 9	.57	.67	.33
Item 10	.72	.48	.52
Item 11	.74	.45	.55
Item 12	.71	.50	.50
Item 13	.62	.62	.38
Item 14	.66	.57	.43
Item 15	.77	.41	.59

Note. Lambda X = factor loadings. Theta Delta = measurement error variances. R^2 = item reliabilities. Goodness-of-fit indices are: χ^2 (df = 90, $p<.01$) = 245.89; GFI = .77; CFI = .76; NNFI = .72; and RMSEA = .13. All T-values for structural coefficients (i.e., Lambda X) are statistically significant ($p<.05$).

Table Y3

LBT Factor 3 (Initiating Structure): Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	.71	.49	.51
Item 2	.73	.47	.53
Item 3	.58	.67	.33
Item 4	.69	.52	.48
Item 5	.55	.70	.30
Item 6	.56	.69	.31
Item 7	.68	.54	.46
Item 8	.65	.58	.42
Item 9	.56	.68	.32
Item 10	.38	.86	.14

Note. Lambda X = factor loadings. Theta Delta = measurement error variances. R^2 = item reliabilities. Goodness-of-fit indices are: χ^2 (df = 35, p<.01) = 65.38; GFI = .88; CFI = .90; NNFI = .87; and RMSEA = .09. All T-values for structural coefficients (i.e., Lambda X) are statistically significant (p<.05).

Table Y4

LBT Factor 4 (Facilitation & Support): Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	.49	.76	.24
Item 2	.72	.48	.52
Item 3	.73	.47	.53
Item 4	.59	.65	.35
Item 5	.64	.59	.41
Item 6	.44	.80	.20
Item 7	.52	.73	.27
Item 8	.60	.64	.36
Item 9	.39	.84	.16
Item 10	.49	.76	.24
Item 11	.44	.80	.20

Note. Lambda X = factor loadings. Theta Delta = measurement error variances. R^2 = item reliabilities. Goodness-of-fit indices are: χ^2 (df = 44, $p<.01$) = 159.99; GFI = .75; CFI = .67; NNFI = .58; and RMSEA = .16. All T-values for structural coefficients (i.e., Lambda X) are statistically significant ($p<.05$).

Table Y5

LBT Factor 5 (Boundary Management): Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	.60	.65	.35
Item 2	.60	.64	.36
Item 3	.46	.79	.21
Item 4	.68	.54	.46
Item 5	.54	.71	.29
Item 6	.57	.68	.32
Item 7	.50	.75	.25
Item 8	.78	.39	.61
Item 9	.72	.49	.51
Item 10	.48	.77	.23

Note. Lambda X = factor loadings. Theta Delta = measurement error variances. R^2 = item reliabilities. Goodness-of-fit indices are: χ^2 (df = 35, p<.01) = 83.52; GFI = .86; CFI = .84; NNFI = .80; and RMSEA = .12. All T-values for structural coefficients (i.e., Lambda X) are statistically significant (p<.05).

APPENDIX Z

Results of LISREL VIII Confirmatory Factor Analysis:

Team Leadership Questionnaire

Table Z1

TLQ Factor 1 (Leader Background): Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	.55	.70	.30
Item 2	.62	.62	.38
Item 3	.61	.62	.38
Item 4	.55	.70	.30
Item 5	.58	.66	.34

Note. Lambda X = factor loadings. Theta Delta = measurement error variances. R^2 = item reliabilities. Goodness-of-fit indices are: χ^2 (df = 5, p<.01) = 15.78; GFI = .93; CFI = .87; NNFI = .75; and RMSEA = .15. All T-values for structural coefficients (i.e., Lambda X) are statistically significant (p<.05).

Table Z2

TLQ Factor 2 (Autonomy/Self-Direction): Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	.47	.78	.22
Item 2	.40	.84	.16
Item 3	.42	.82	.18
Item 4	.35	.87	.13
Item 5	.36	.87	.13
Item 6	.32	.90	.10
Item 7	.49	.76	.24

Note. Lambda X = factor loadings. Theta Delta = measurement error variances. R^2 = item reliabilities. Goodness-of-fit indices are: χ^2 (df = 14, p>.01, ns) = 13.92; GFI = .96; CFI = 1.00; NNFI = 1.00; and RMSEA = .00. All T-values for structural coefficients (i.e., Lambda X) are statistically significant (p<.05).

Table Z3

TLQ Factor 3 (Leader Demographics): Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	.89	.21	.79
Item 2	.54	.71	.29
Item 3	.59	.66	.34

Note. Lambda X = factor loadings. Theta Delta = measurement error variances. R^2 = item reliabilities. Goodness-of-fit indices cannot be calculated due to zero degrees of freedom. All T-values for structural coefficients (i.e., Lambda X) are statistically significant ($p<.05$).

Table Z4

TLQ Factor 4 (Substitutes for Leadership): Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	.66	.57	.43
Item 2	.58	.67	.33
Item 3	.56	.68	.32
Item 4	.20	.96	.04
Item 5	.20	.96	.04

Note. Lambda X = factor loadings. Theta Delta = measurement error variances. R^2 = item reliabilities. Goodness-of-fit indices are: χ^2 (df = 5, p>.01, ns) = 4.77; GFI = .98; CFI = 1.00; NNFI = 1.00; and RMSEA = .00. T-values for the structural coefficients (i.e., Lambda X) associated with Items 4 and 5 were not statistically significant at the p<.05 level.

Table Z5

TLQ Factor 5 (Leader Power): Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	.48	.77	.23
Item 2	.30	.91	.09
Item 3	.63	.60	.40
Item 4	.50	.75	.25
Item 5	.27	.93	.07

Note. Lambda X = factor loadings. Theta Delta = measurement error variances. R^2 = item reliabilities. Goodness-of-fit indices are: χ^2 (df = 5, p>.01, ns) = 10.44; GFI = .96; CFI = .83; NNFI = .66; and RMSEA = .10. All T-values for structural coefficients (i.e., Lambda X) are statistically significant (p<.05).

Table Z6

TLQ Factor 6 (Leader-Member Relations): Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	.61	.63	.37
Item 2	.47	.78	.22
Item 3	.33	.89	.11
Item 4	.22	.95	.05
Item 5	.17	.97	.03

Note. Lambda X = factor loadings. Theta Delta = measurement error variances. R^2 = item reliabilities. Goodness-of-fit indices are: χ^2 (df = 5, p>.01, ns) = 5.41; GFI = .98; CFI = .97; NNFI = .94; and RMSEA = .03. T-values for the structural coefficients (i.e., Lambda X) associated with Items 4 and 5 were not statistically significant at the p<.05 level.

APPENDIX AA

Results of LISREL VIII Confirmatory Factor Analysis:

LBDQ for Team Leadership

Table AA1

Representation Subscale: Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	.89	.21	.79
Item 2	.92	.16	.84
Item 3	.66	.56	.44
Item 4	.53	.72	.28
Item 5	.35	.88	.12

Note. Lambda X = factor loadings. Theta Delta = measurement error variances. R^2 = item reliabilities. Goodness-of-fit indices are: χ^2 (df = 5, p<.01) = 18.38; GFI = .94; CFI = .94; NNFI = .87; and RMSEA = .16. All T-values for structural coefficients (i.e., Lambda X) are statistically significant (p<.05).

Table AA2

Initiating Structure Subscale: Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	.52	.73	.27
Item 2	.38	.86	.14
Item 3	.32	.90	.10
Item 4	.47	.78	.22
Item 5	.43	.81	.19
Item 6	.41	.83	.17
Item 7	.56	.68	.32
Item 8	.62	.61	.39
Item 9	.67	.55	.45
Item 10	.59	.66	.34
Item 11	.39	.85	.15
Item 12	.32	.90	.10
Item 13	.65	.58	.42

Note. Lambda X = factor loadings. Theta Delta = measurement error variances. R^2 = item reliabilities. Goodness-of-fit indices are: χ^2 (df = 65, p<.01) = 139.13; GFI = .83; CFI = .73; NNFI = .68; and RMSEA = .11. All T-values for structural coefficients (i.e., Lambda X) are statistically significant (p<.05).

Table AA3

Tolerance of Freedom Subscale: Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	.50	.75	.25
Item 2	.62	.61	.39
Item 3	.52	.73	.27
Item 4	.71	.50	.50
Item 5	.37	.86	.14
Item 6	.68	.54	.46
Item 7	.57	.67	.33
Item 8	.66	.56	.44
Item 9	.46	.78	.22
Item 10	.64	.60	.40

Note. Lambda X = factor loadings. Theta Delta = measurement error variances. R^2 = item reliabilities. Goodness-of-fit indices are: χ^2 (df = 35, $p<.01$) = 91.54; GFI = .84; CFI = .80; NNFI = .74; and RMSEA = .13. All T-values for structural coefficients (i.e., Lambda X) are statistically significant ($p<.05$).

Table AA4

Role Assumption Subscale: Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	.32	.90	.10
Item 2	.42	.82	.18
Item 3	.55	.69	.31
Item 4	.47	.78	.22
Item 5	.43	.81	.19
Item 6	.43	.81	.19
Item 7	.40	.84	.16
Item 8	.48	.77	.23
Item 9	.71	.50	.50
Item 10	.60	.64	.36
Item 11	.73	.46	.54
Item 12	.52	.73	.27

Note. Lambda X = factor loadings. Theta Delta = measurement error variances. R^2 = item reliabilities. Goodness-of-fit indices are: χ^2 (df = 54, $p<.01$) = 163.52; GFI = .79; CFI = .65; NNFI = .57; and RMSEA = .14. All T-values for structural coefficients (i.e., Lambda X) are statistically significant ($p<.05$).

Table AA5

Integration Subscale: Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	.65	.57	.43
Item 2	.57	.68	.32
Item 3	.65	.58	.42
Item 4	.60	.63	.37
Item 5	.72	.48	.52
Item 6	.84	.29	.71
Item 7	.53	.71	.29

Note. Lambda X = factor loadings. Theta Delta = measurement error variances. R^2 = item reliabilities. Goodness-of-fit indices are: χ^2 (df = 14, p<.01) = 52.80; GFI = .87; CFI = .85; NNFI = .77; and RMSEA = .17. All T-values for structural coefficients (i.e., Lambda X) are statistically significant (p<.05).

Table AA6

Consideration Subscale: Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	.45	.79	.21
Item 2	.43	.82	.18
Item 3	.58	.66	.34
Item 4	.60	.65	.35
Item 5	.69	.52	.48
Item 6	.30	.91	.09
Item 7	.62	.61	.39
Item 8	.57	.67	.33
Item 9	.57	.68	.32
Item 10	.56	.69	.31
Item 11	.53	.72	.28

Note. Lambda X = factor loadings. Theta Delta = measurement error variances. R^2 = item reliabilities. Goodness-of-fit indices are: χ^2 (df = 44, p<.01) = 102.96; GFI = .83; CFI = .78; NNFI = .72; and RMSEA = .12. All T-values for structural coefficients (i.e., Lambda X) are statistically significant (p<.05).

Table AA7

Transformational Leadership Subscale: Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	.46	.79	.21
Item 2	.61	.63	.37
Item 3	.57	.67	.33
Item 4	.28	.92	.08
Item 5	.68	.54	.46
Item 6	.59	.65	.35
Item 7	.82	.33	.67
Item 8	.86	.26	.74
Item 9	.75	.44	.56
Item 10	.54	.71	.29
Item 11	.62	.61	.39
Item 12	.40	.84	.16
Item 13	.55	.70	.30

Note. Lambda X = factor loadings. Theta Delta = measurement error variances. R^2 = item reliabilities. Goodness-of-fit indices are: χ^2 (df = 65, p<.01) = 111.15; GFI = .83; CFI = .90; NNFI = .88; and RMSEA = .08. All T-values for structural coefficients (i.e., Lambda X) are statistically significant (p<.05).

APPENDIX BB

Results of LISREL VIII Confirmatory Factor Analysis:

Teamness Index

Table BB1

Teamness Index: Factor Loadings, Error Variances, and Item Reliabilities

	Lambda X	Theta Delta	R^2
Item 1	.44	.81	.19
Item 2	.14	.98	.02
Item 3	.54	.71	.29
Item 4	.19	.96	.04
Item 5	.15	.98	.02
Item 6	.64	.59	.41
Item 7	.23	.95	.05
Item 8	.52	.73	.27
Item 9	.59	.66	.34
Item 10	.63	.60	.40
Item 11	.67	.55	.45
Item 12	.54	.70	.30

Note. Lambda X = factor loadings. Theta Delta = measurement error variances. R^2 = item reliabilities. Goodness-of-fit indices are: χ^2 (df = 54, p<.01) = 164.76; GFI = .77; CFI = .59; NNFI = .50; and RMSEA = .14. The T-values for the structural coefficients (i.e., Lambda X) of Items 2, 4, and 5 are not statistically significant (p<.05).

APPENDIX CC

BASIC Program for Calculating Adjusted Rand Index

```
' RAND INDEX PROGRAM (cf. Hubert & Arabie)
' To read output file from SAS Cluster Analysis (CX.LIS)
' G. D. Coates 10/15/95
'
SCREEN 9: COLOR 14, 1
DEFDBL D, N
OPEN "i", 1, "cx.lis": OPEN "o", 2, "cx.ran"
PRINT #2, "Cluster Summary by Observation from CLUSTERX SAS"
PRINT #2,
10 IF EOF(1) THEN CLOSE #1: GOTO 99
J = J + 1
LINE INPUT #1, A$
IF J = 1 THEN r$ = MID$(A$, 37, 7): C$ = MID$(A$, 48, 7)
PRINT #2, A$
GOTO 10
99 PRINT #2, CHR$(12)
OPEN "i", 1, "cx.lis"
LINE INPUT #1, A$
LINE INPUT #1, A$
20 IF EOF(1) THEN 88
INPUT #1, NOB, NS, JX, JY
IF JX > MAXR THEN MAXR = JX
IF JY > MAXC THEN MAXC = JY
NCL(JX, JY) = NCL(JX, JY) + 1
NR(JX) = NR(JX) + 1
NC(JY) = NC(JY) + 1
NT = NT + 1
GOTO 20

88 PRINT #2, "Frequency Contingency Table": PRINT #2,
PRINT #2, TAB(20); C$
PRINT #2, TAB(5);
FOR I = 1 TO MAXC
PRINT #2, USING "    #   "; I;
NEXT: PRINT #2, : PRINT #2, r$
FOR J = 1 TO MAXR
PRINT #2, TAB(2); : PRINT #2, USING "#"; J;
FOR I = 1 TO MAXC
PRINT #2, USING "  #####"; NCL(J, I);
N = NCL(J, I): GOSUB COMB: CCL(J, I) = cm
tcl = tcl + cm
NEXT:
PRINT #2, USING "     #####"; NR(J)
N = NR(J): GOSUB COMB: CR(J) = cm
tcr = tcr + cm
NEXT
PRINT #2, : PRINT #2, TAB(3);
FOR I = 1 TO MAXC
PRINT #2, USING "  #####"; NC(I);
N = NC(I): GOSUB COMB: CC(I) = cm
tcc = tcc + cm
```

```
NEXT:
PRINT #2, USING "     #####"; NT
N = NT: GOSUB COMB: ct = cm
PRINT #2, : PRINT #2,
PRINT #2, "Combinations Contingency Table": PRINT #2,
PRINT #2, TAB(20); C$
PRINT #2, TAB(5);
FOR I = 1 TO MAXC
PRINT #2, USING "    #  "; I;
NEXT: PRINT #2, : PRINT #2, r$
FOR J = 1 TO MAXR
PRINT #2, TAB(2); : PRINT #2, USING "#"; J;
FOR I = 1 TO MAXC
PRINT #2, USING "  #####"; CCL(J, I);
NEXT:
PRINT #2, USING "     #####"; CR(J)
NEXT
PRINT #2, : PRINT #2, TAB(3);
FOR I = 1 TO MAXC
PRINT #2, USING "  #####"; CC(I);
NEXT:
PRINT #2, USING "     #####"; ct
PRINT #2, : PRINT #2,
num = tcl - (tcr * tcc / ct)
den = (tcr + tcc) / 2 - (tcr * tcc / ct)
r = num / den
ru = (ct + 2 * tcl - (tcc + tcr)) / ct
rx = 1 + 2 * ((tcr * tcc) / ct ^ 2) - (tcr + tcc) / ct
PRINT #2, "Rand Index = "; : PRINT #2, USING "###.#####"; ru
PRINT #2, "Expected Rand Index = "; : PRINT #2, USING
"###.#####"; rx
PRINT #2, "Maximum Rand Index = "; : PRINT #2, USING
"###.#####";
1
PRINT #2, "Corrected Rand Index = "; : PRINT #2, USING "
###.#####"; r

END
COMB:
IF N < 1 THEN cm = 0: RETURN
num = 1: den = 1
FOR K = N TO 1 STEP -1
num = num * K
NN = num
NEXT
L = N - 2: IF L = 0 THEN 77
FOR K = L TO 1 STEP -1
den = den * K
NEXT
77 den = den * 2
cm = num / den
RETURN
```

APPENDIX DD

Composition of Three Cluster Solutions for Sample A via Ward's Method

Table DD1

Five-Cluster Solution for Sample A via Ward's Method

Cluster	Team	Frequency
1	Quality/Process Improvement Team	4
	Interdepartmental Committee/Project Team	4
	Ergonomic/Human Factors Design Team	1
	Interdepartmental Cross-Functional Work Team	1
	Singing/Musical Group/Ensemble	1
	Volunteer Emergency Rescue Squad/ALS Team	1
		12
2	Quality/Process Improvement Team	1
	Lacrosse Team	1
	Fire Dept. Engine/Truck/Ladder Company	2
	Technical Rescue Team	1
	Interdepartmental Cross-Functional Work Team	1
	Manufacturing/Assembly Team	1
	Building Inspections Team	2
	Office Assistants Team	1
	Natural Gas Construction Crew	1
	Acting Cast/Ensemble	1
		12
3	Quality/Process Improvement Team	1
	Interdepartmental Committee/Project Team	1
	Field Hockey Team	1
	Basketball Team	1
	Football Team	1
	Aircraft Cockpit Crew	1
	Navy Message Center Team	1
	Emergency Dive Team	1
	Boat Team/Surf-Rescue Squad	1
	Technical Rescue Team	1
	Volunteer Emergency Rescue Squad/ALS Team	2
		12
4	Automotive Service Team	2
	Aircraft Cockpit Crew	1
	Soccer Team	1
	Natural Gas Construction Crew	1
	Interdepartmental Cross-Functional Work Team	1
	Fire Dept. Engine/Truck/Ladder Company	1
	Emergency Grant Program	1
	Building Inspections Team	1
		9
5	Process Management Team	1
	Ergonomic/Human Factors Design Team	1
	Building Inspections Team	1
	Manufacturing/Assembly Team	1
	Organizational Planning Department	1
		5

Table DD2

Six-Cluster Solution for Sample A via Ward's Method

Cluster	Team	Frequency
1	Quality/Process Improvement Team	4
	Interdepartmental Committee/Project Team	4
	Ergonomic/Human Factors Design Team	1
	Interdepartmental Cross-Functional Work Team	1
	Singing/Musical Group/Ensemble	1
	Volunteer Emergency Rescue Squad/ALS Team	1
		12
2	Quality/Process Improvement Team	1
	Lacrosse Team	1
	Fire Dept. Engine/Truck/Ladder Company	2
	Technical Rescue Team	1
	Interdepartmental Cross-Functional Work Team	1
	Manufacturing/Assembly Team	1
	Building Inspections Team	2
	Office Assistants Team	1
	Natural Gas Construction Crew	1
	Acting Cast/Ensemble	1
		12
3	Quality/Process Improvement Team	1
	Interdepartmental Committee/Project Team	1
	Aircraft Cockpit Crew	1
	Emergency Dive Team	1
	Boat Team/Surf-Rescue Squad	1
	Technical Rescue Team	1
	Volunteer Emergency Rescue Squad/ALS Team	1
		7
4	Automotive Service Team	2
	Aircraft Cockpit Crew	1
	Soccer Team	1
	Natural Gas Construction Crew	1
	Interdepartmental Cross-Functional Work Team	1
	Fire Dept. Engine/Truck/Ladder Company	1
	Emergency Grant Program	1
	Building Inspections Team	1
		9
5	Process Management Team	1
	Ergonomic/Human Factors Design Team	1
	Building Inspections Team	1
	Manufacturing/Assembly Team	1
	Organizational Planning Department	1
		5
6	Field Hockey Team	1
	Basketball Team	1
	Football Team	1
	Navy Message Center Team	1
	Volunteer Emergency Rescue Squad/ALS Team	1
		5

Table DD3

Seven-Cluster Solution for Sample A via Ward's Method

Cluster	Team	Frequency
	Quality/Process Improvement Team	3
	Interdepartmental Committee/Project Team	3
	Ergonomic/Human Factors Design Team	1
1	Interdepartmental Cross-Functional Work Team	1
	Singing/Musical Group/Ensemble	1
	Volunteer Emergency Rescue Squad/ALS Team	1
		10
	Quality/Process Improvement Team	1
	Lacrosse Team	1
	Fire Dept. Engine/Truck/Ladder Company	2
	Technical Rescue Team	1
2	Interdepartmental Cross-Functional Work Team	1
	Manufacturing/Assembly Team	1
	Building Inspections Team	2
	Office Assistants Team	1
	Natural Gas Construction Crew	1
	Acting Cast/Ensemble	1
		12
	Quality/Process Improvement Team	1
	Interdepartmental Committee/Project Team	1
	Aircraft Cockpit Crew	1
3	Emergency Dive Team	1
	Boat Team/Surf-Rescue Squad	1
	Technical Rescue Team	1
	Volunteer Emergency Rescue Squad/ALS Team	1
		7
	Automotive Service Team	2
	Aircraft Cockpit Crew	1
	Soccer Team	1
	Natural Gas Construction Crew	1
4	Interdepartmental Cross-Functional Work Team	1
	Fire Dept. Engine/Truck/Ladder Company	1
	Emergency Grant Program	1
	Building Inspections Team	1
		9
	Process Management Team	1
	Ergonomic/Human Factors Design Team	1
5	Building Inspections Team	1
	Manufacturing/Assembly Team	1
	Organizational Planning Department	1
		5
	Field Hockey Team	1
	Basketball Team	1
6	Football Team	1
	Navy Message Center Team	1
	Volunteer Emergency Rescue Squad/ALS Team	1
		5

(Continued)

Table DD3 (Continued)

Cluster	Team	Frequency
7	Quality/Process Improvement Team	1
	Interdepartmental Committee/Project Team	1
		2

APPENDIX EE

Composition of Three Cluster Solutions for Sample B via Ward's Method

Table EE1

Five-Cluster Solution for Sample B via Ward's Method

Cluster	Team	Frequency
	Diving Team	1
	Golf Team	1
	Volleyball Team	1
1	Quality/Process Improvement Team	2
	Administrative Board	1
	Fire Battalion	1
	Cost Engineering/Cost Down Team	1
		8
	Fire Dept. Inspection/Investigation Team	1
	Technical Rescue Team	1
2	Interdepartmental Cross-Functional Work Team	2
	Remanufacturing/Reassembly Team	1
	Operations/Inspections Bureau	2
	HAZMAT Team	2
		9
	Automotive Service Team	2
	Field Hockey Team	1
	Basketball Team	1
	Soccer Team	1
	Lacrosse Team	1
3	Natural Gas Construction Crew	2
	Navy Combat Systems Training Team	1
	FPA OSH Team (Fire Safety Team)	1
	Fire Dept. Engine/Truck/Ladder Company	1
	HAZMAT Team	1
	Manufacturing/Assembly Team	1
	Volunteer Emergency Rescue Squad/ALS Team	1
		14
	HAZMAT Team	1
	Fire Dept. Engine/Truck/Ladder Company	1
	Self-Funded Designated Service Unit	1
	Building Inspections Team	1
	Operations/Inspections Bureau	1
4	City SWEEPS Project Team	1
	Manufacturing/Assembly Team	1
	Navy Tactical Warfare Team	1
	SERT Team	1
	Volunteer Emergency Rescue Squad/ALS Team	1
	Softball Team	1
	Soccer Team	1
		12
	Quality/Process Improvement Team	4
5	Interdepartmental Committee/Project Team	1
	Interdepartmental Cross-Functional Training Team	1
	Operations/Inspections Bureau	1
		7

Table EE2

Six-Cluster Solution for Sample B via Ward's Method

Cluster	Team	Frequency
	Diving Team	1
	Golf Team	1
	Volleyball Team	1
1	Quality/Process Improvement Team	2
	Administrative Board	1
	Fire Battalion	1
	Cost Engineering/Cost Down Team	1
		8
	Fire Dept. Inspection/Investigation Team	1
	Technical Rescue Team	1
2	Interdepartmental Cross-Functional Work Team	2
	Remanufacturing/Reassembly Team	1
	Operations/Inspections Bureau	2
	HAZMAT Team	2
		9
	Automotive Service Team	2
	Field Hockey Team	1
	Basketball Team	1
	Soccer Team	1
	Lacrosse Team	1
3	Natural Gas Construction Crew	2
	Navy Combat Systems Training Team	1
	FPA OSH Team (Fire Safety Team)	1
	Fire Dept. Engine/Truck/Ladder Company	1
	HAZMAT Team	1
	Manufacturing/Assembly Team	1
	Volunteer Emergency Rescue Squad/ALS Team	1
		14
	HAZMAT Team	1
	Fire Dept. Engine/Truck/Ladder Company	1
	Self-Funded Designated Service Unit	1
	Building Inspections Team	1
4	Operations/Inspections Bureau	1
	Manufacturing/Assembly Team	1
	SERT Team	1
	Volunteer Emergency Rescue Squad/ALS Team	1
	Softball Team	1
	Soccer Team	1
		10
	Quality/Process Improvement Team	4
5	Interdepartmental Committee/Project Team	1
	Interdepartmental Cross-Functional Training Team	1
	Operations/Inspections Bureau	1
		7
6	Navy Tactical Warfare Team	1
	City SWEEPS Project Team	1
		2

Table EE3

Seven-Cluster Solution for Sample B via Ward's Method

Cluster	Team	Frequency
	Diving Team	1
	Golf Team	1
	Volleyball Team	1
1	Quality/Process Improvement Team	2
	Administrative Board	1
	Fire Battalion	1
	Cost Engineering/Cost Down Team	1
		8
	Fire Dept. Inspection/Investigation Team	1
	Technical Rescue Team	1
2	Interdepartmental Cross-Functional Work Team	2
	Remanufacturing/Reassembly Team	1
	Operations/Inspections Bureau	2
	HAZMAT Team	2
		9
	Automotive Service Team	2
	Field Hockey Team	1
	Basketball Team	1
	Soccer Team	1
	Lacrosse Team	1
3	Natural Gas Construction Crew	2
	Navy Combat Systems Training Team	1
	FPA OSH Team (Fire Safety Team)	1
	Fire Dept. Engine/Truck/Ladder Company	1
	HAZMAT Team	1
	Manufacturing/Assembly Team	1
	Volunteer Emergency Rescue Squad/ALS Team	1
		14
	HAZMAT Team	1
	Fire Dept. Engine/Truck/Ladder Company	1
	Self-Funded Designated Service Unit	1
	Building Inspections Team	1
4	Operations/Inspections Bureau	1
	Manufacturing/Assembly Team	1
	SERT Team	1
	Volunteer Emergency Rescue Squad/ALS Team	1
	Softball Team	1
	Soccer Team	1
		10
	Quality/Process Improvement Team	4
5	Interdepartmental Committee/Project Team	1
	Interdepartmental Cross-Functional Training Team	1
		6
6	Navy Tactical Warfare Team	1
	City SWEEPS Project Team	1
		2
7	Operations/Inspections Bureau	1

APPENDIX FF

Composition of Three Cluster Solutions for

Sample B via Nearest Centroid Clustering Procedure

Table FF1

Five-Cluster Solution for Sample B via Nearest Centroid Clustering Procedure

Cluster	Team	Frequency
	Golf Team	1
	Volleyball Team	1
1	Quality/Process Improvement Team	2
	Interdepartmental Committee/Project Team	1
	Administrative Board	1
		6
	Fire Dept. Inspection/Investigation Team	1
	Technical Rescue Team	1
2	Interdepartmental Cross-Functional Work Team	2
	Remanufacturing/Reassembly Team	1
	Operations/Inspections Bureau	2
	HAZMAT Team	2
		9
	Automotive Service Team	2
	Field Hockey Team	1
	Basketball Team	1
	Soccer Team	1
	Softball Team	1
	Lacrosse Team	1
3	Natural Gas Construction Crew	2
	Navy Combat Systems Training Team	1
	FPA OSH Team (Fire Safety Team)	1
	Interdepartmental Cross-Functional Training Team	1
	HAZMAT Team	1
	Manufacturing/Assembly Team	1
	Quality/Process Improvement Team	4
	Volunteer Emergency Rescue Squad/ALS Team	1
		19
	HAZMAT Team	1
	Fire Dept. Engine/Truck/Ladder Company	2
	Building Inspections Team	1
	City SWEEPS Project Team	1
4	Navy Tactical Warfare Team	1
	SERT Team	1
	Volunteer Emergency Rescue Squad/ALS Team	1
	Diving Team	1
	Soccer Team	1
		10
	Self-Funded Designated Service Unit	1
	Manufacturing/Assembly Team	1
5	Fire Battalion	1
	Cost Engineering/Cost Down Team	1
	Operations/Inspections Bureau	2
		6

Table FF2

Six-Cluster Solution for Sample B via Nearest Centroid Clustering Procedure

Cluster	Team	Frequency
	Golf Team	1
	Volleyball Team	1
1	Quality/Process Improvement Team	2
	Interdepartmental Committee/Project Team	1
		5
	Fire Dept. Inspection/Investigation Team	1
	Technical Rescue Team	1
2	Interdepartmental Cross-Functional Work Team	2
	Remanufacturing/Reassembly Team	1
	Operations/Inspections Bureau	2
	HAZMAT Team	2
		9
	Automotive Service Team	2
	Field Hockey Team	1
	Basketball Team	1
	Soccer Team	1
	Lacrosse Team	1
	Natural Gas Construction Crew	2
3	Navy Combat Systems Training Team	1
	FPA OSH Team (Fire Safety Team)	1
	Interdepartmental Cross-Functional Training Team	1
	HAZMAT Team	1
	Manufacturing/Assembly Team	1
	Quality/Process Improvement Team	3
	Volunteer Emergency Rescue Squad/ALS Team	1
		17
	HAZMAT Team	1
	Fire Dept. Engine/Truck/Ladder Company	1
	Building Inspections Team	1
	City SWEEPS Project Team	1
4	Navy Tactical Warfare Team	1
	SERT Team	1
	Volunteer Emergency Rescue Squad/ALS Team	1
	Diving Team	1
	Soccer Team	1
		9
	Self-Funded Designated Service Unit	1
	Softball Team	1
	Quality/Process Improvement Team	1
5	Fire Battalion	1
	Administrative Board	1
	Cost Engineering/Cost Down Team	1
	Operations/Inspections Bureau	1
		7

(Continued)

Table FF2 (Continued)

Cluster	Team	Frequency
	Manufacturing/Assembly Team	1
6	Fire Dept. Engine/Truck/Ladder Company	1
	Operations/Inspections Bureau	1
		3

Table FF3

Seven-Cluster Solution for Sample B via Nearest Centroid Clustering Procedure

Cluster	Team	Frequency
	Golf Team	1
	Volleyball Team	1
1	Quality/Process Improvement Team	2
	Interdepartmental Committee/Project Team	1
		5
	Fire Dept. Inspection/Investigation Team	1
	Technical Rescue Team	1
	Interdepartmental Cross-Functional Work Team	2
2	Remanufacturing/Reassembly Team	1
	Building Inspections Team	1
	Operations/Inspections Bureau	2
	HAZMAT Team	2
		10
	Automotive Service Team	2
	Field Hockey Team	1
	Basketball Team	1
	Soccer Team	1
	Lacrosse Team	1
	Natural Gas Construction Crew	2
3	Navy Combat Systems Training Team	1
	FPA OSH Team (Fire Safety Team)	1
	Interdepartmental Cross-Functional Training Team	1
	HAZMAT Team	1
	Manufacturing/Assembly Team	1
	Quality/Process Improvement Team	4
	Volunteer Emergency Rescue Squad/ALS Team	1
		18
	HAZMAT Team	1
	Fire Dept. Engine/Truck/Ladder Company	1
	City SWEEPS Project Team	1
4	Navy Tactical Warfare Team	1
	SERT Team	1
	Volunteer Emergency Rescue Squad/ALS Team	1
	Soccer Team	1
		7
	Self-Funded Designated Service Unit	1
	Fire Battalion	1
5	Administrative Board	1
	Cost Engineering/Cost Down Team	1
	Operations/Inspections Bureau	1
		5

(Continued)

Table FF3 (Continued)

Cluster	Team	Frequency
	Manufacturing/Assembly Team	1
6	Fire Dept. Engine/Truck/Ladder Company	1
	Softball Team	1
	Diving Team	1
		4
7	Operations/Inspections Bureau	1

APPENDIX GG

Comparison of MANOVA Results for Three Cluster Solutions

Table GG1

Comparison of MANOVA Results for Three Cluster Solutions with Teamness Index as Dependent Measure

Cluster Solution	Wilks' Lambda	F	p
5-cluster	.3754	1.96	.0003
6-cluster	.3324	1.73	.0056
7-cluster	.2811	1.65	.0014

Note. p-values are exact.

Table GG2

Comparison of MANOVA Results for Three Cluster Solutions with Team Leadership Questionnaire as Dependent Measure

Cluster Solution	Wilks' Lambda	F	p
5-cluster	.4130	3.79	.0001
6-cluster	.3755	3.31	.0001
7-cluster	.3091	3.31	.0001

Note. p-values are exact.

Table GG3

Comparison of MANOVA Results for Three Cluster Solutions with Behavioral Items from Team Leadership Interview as Dependent Measure

Cluster Solution	Wilks' Lambda	F	p
5-cluster	.1847	1.59	.0017
6-cluster	.1626	1.32	.0279
7-cluster	.0956	1.43	.0033

Note. p-values are exact.

Table GG4

Comparison of MANOVA Results for Three Cluster Solutions with Descriptive Items from Team Leadership Interview as Dependent Measure

Cluster Solution	Wilks' Lambda	F	p
5-cluster	.4783	1.58	.0143
6-cluster	.4402	1.38	.0437
7-cluster	.3479	1.49	.0115

Note. p-values are exact.

APPENDIX HH

Results of Item-Level ANOVAs for Questionnaire

After the significant factors from the Team Leadership Questionnaire were identified, an additional series of ANOVAs was conducted to identify significant items comprising the significant factors. What follows is a summary of those items found to be significantly affected by team leadership type.

1. A significant main effect of team leadership type was found for four of the items comprising the "Leader Background" Factor. Specifically, there was a main effect on:

   a) the item related to the importance of leader intelligence for leadership effectiveness, F (4, 95) = 2.87, $p < .05$,

   b) the item related to the importance of leadership experience for leadership effectiveness, F (4, 95) = 2.59, $p < .05$,

   c) the item related to the importance of a leader's personality for leadership effectiveness, F (4, 95) = 4.23, $p < .01$, and

   d) the item regarding the importance of leadership stability for leadership effectiveness, F (4, 95) = 6.38, $p < .001$.

2. A significant main effect of team leadership type was found for three of the items comprising the "Autonomy/Self-Direction" Factor. Specifically, there was a main effect on:

   a) the item related to the leader's typical workweek, F (4, 95) = 5.02, $p < .001$,

   b) the item related to whether the leader derives power or holds influence as a result of team-related expertise, F (4, 95) = 5.57, $p < .001$, and

   c) the item regarding the extent of leadership coming from a formal leader outside the team, F (4, 95) = 4.36, $p < .01$.

3. A significant main effect of team leadership type was found for one of the items comprising the "Leader Demographics" Factor. Specifically, there was a main effect for:

   a) the item regarding the importance or impact of leader age on leadership effectiveness, F (4, 95) = 2.49, $p < .05$.

4. A significant main effect of team leadership type was found for two of the items comprising the "Leader Power" Factor. Specifically, there was a main effect for:

   a) the item regarding the amount of authority held by the leader to make decisions affecting the entire team, F (4, 95) = 4.24, $p < .01$, and

   b) the item related to whether the leader holds coercive power over the team members, F (4, 95) = 2.93, $p < .05$.

APPENDIX II

Figures Showing Post Hoc Results Related to Teamness Index

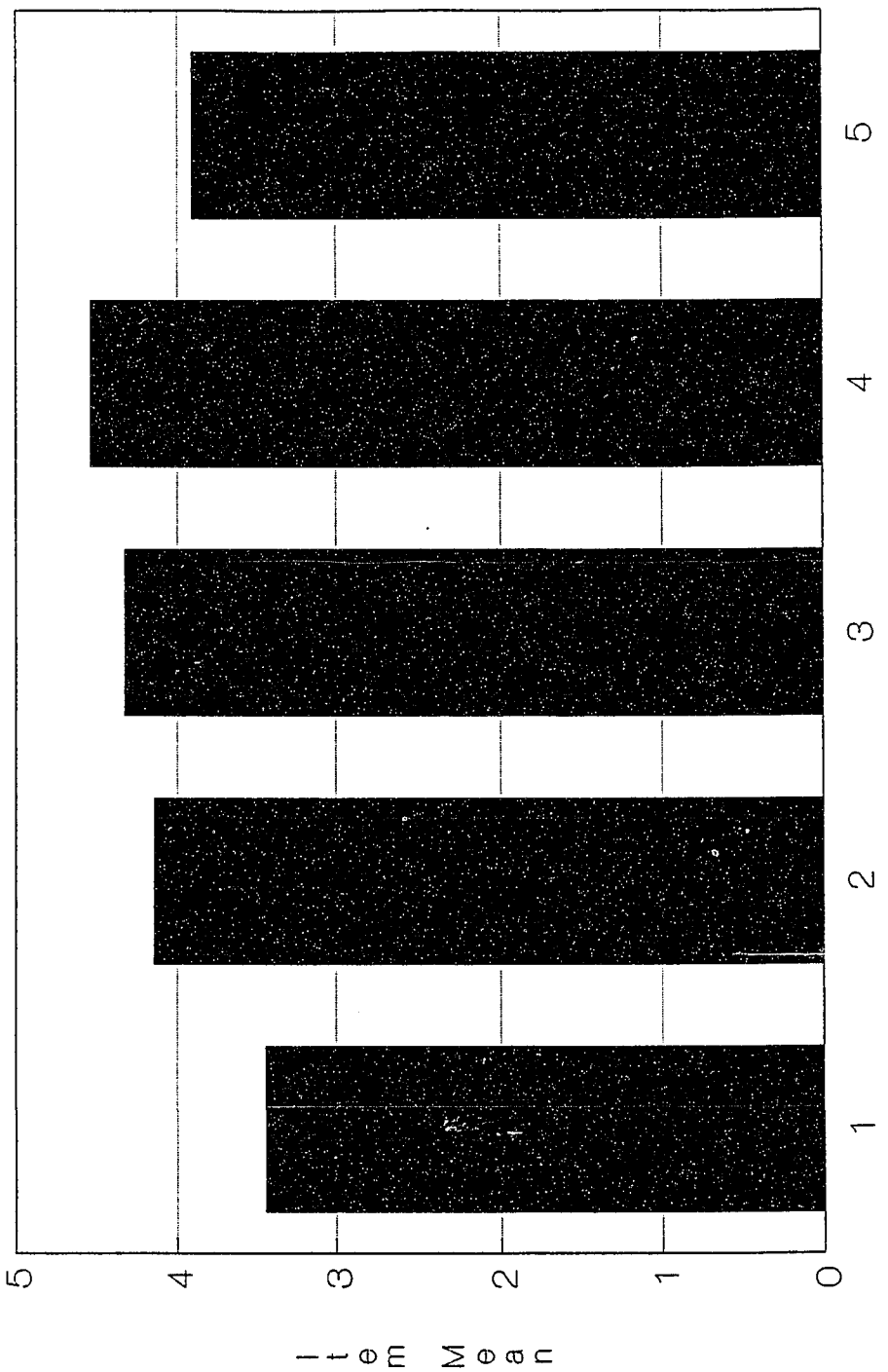

Figure III. Mean of Teamness Index item 4 by cluster.

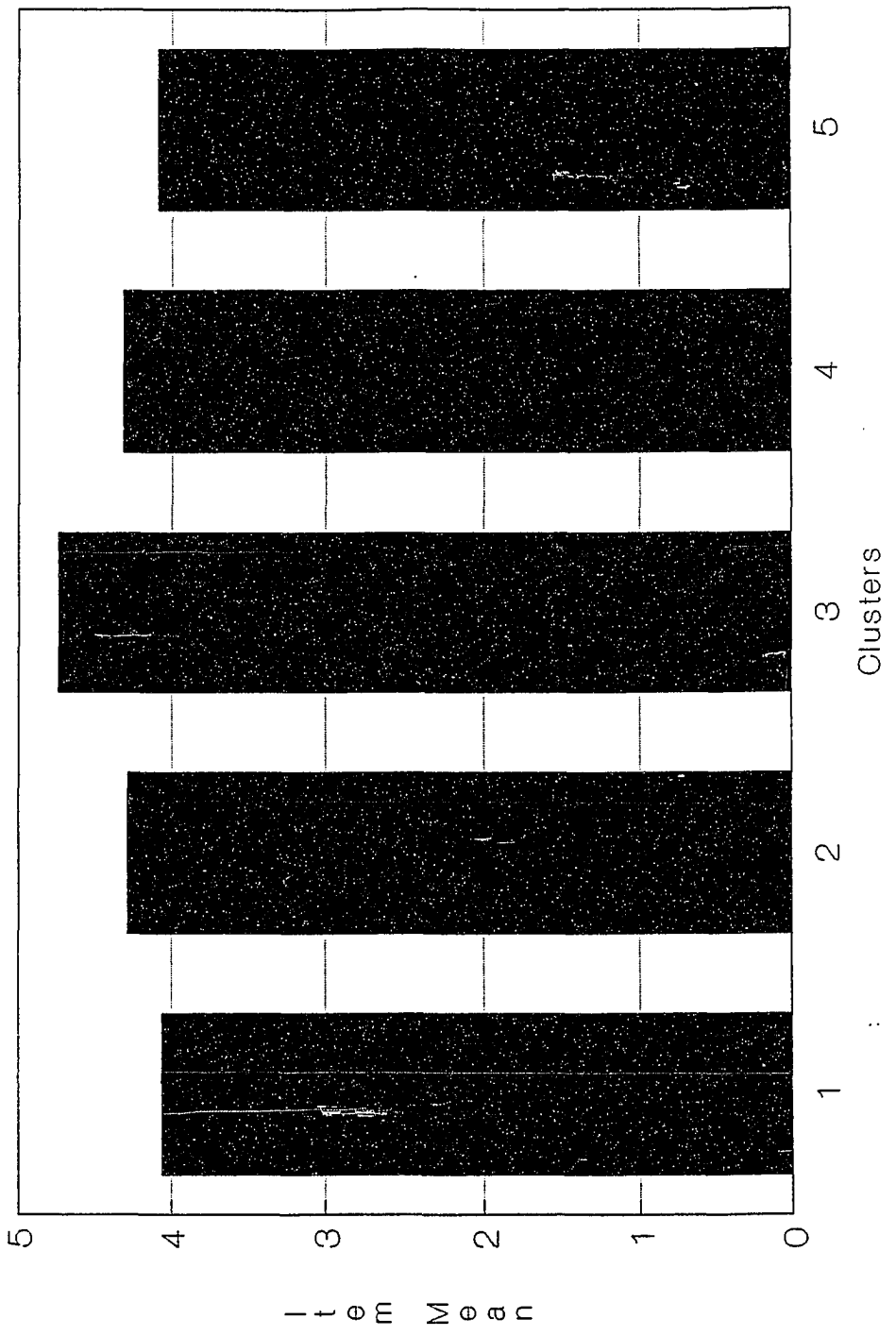

Figure II2. Mean of Teamness Index item 7 by cluster.

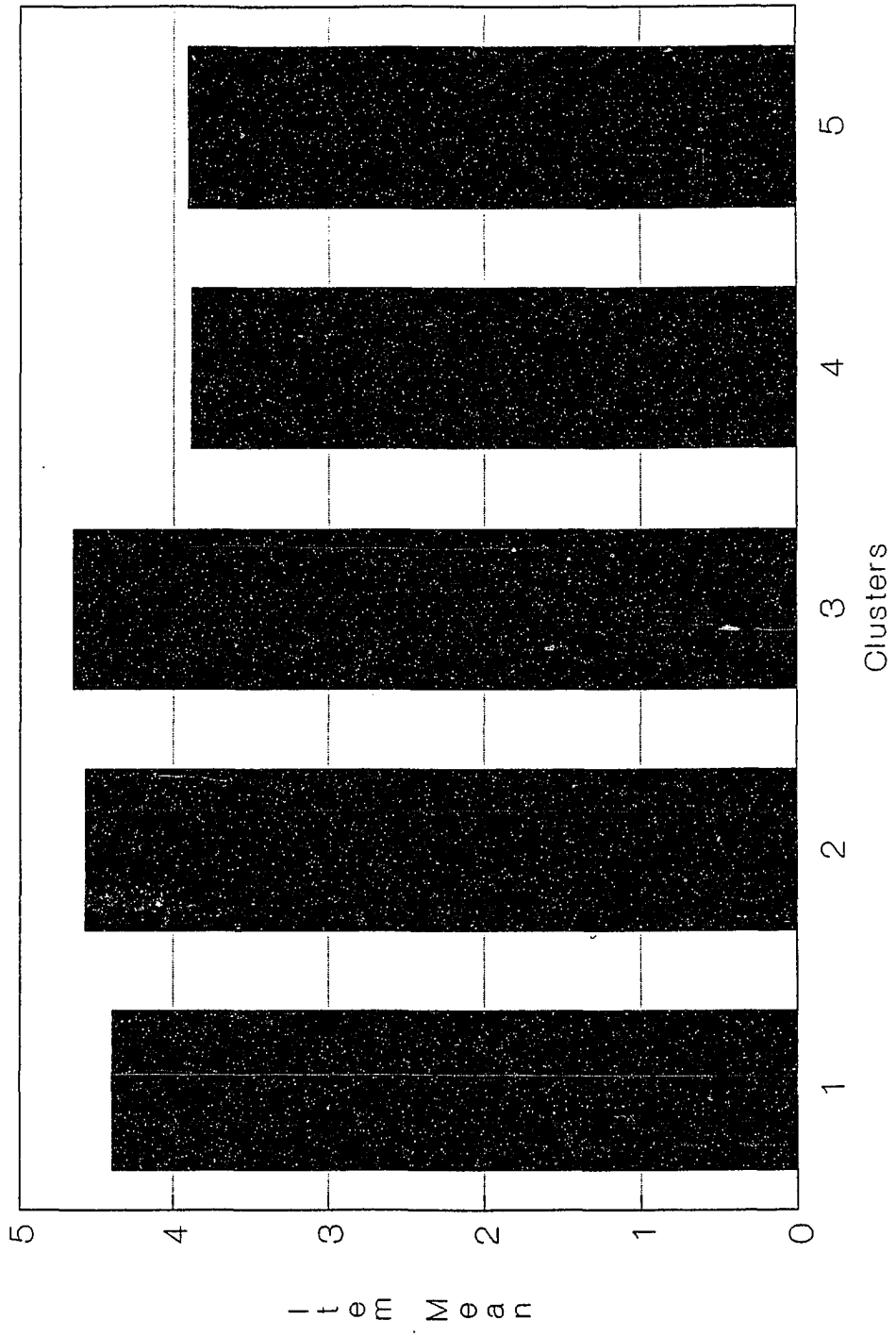

Figure II3. Mean of Teamness Index item 10 by cluster.

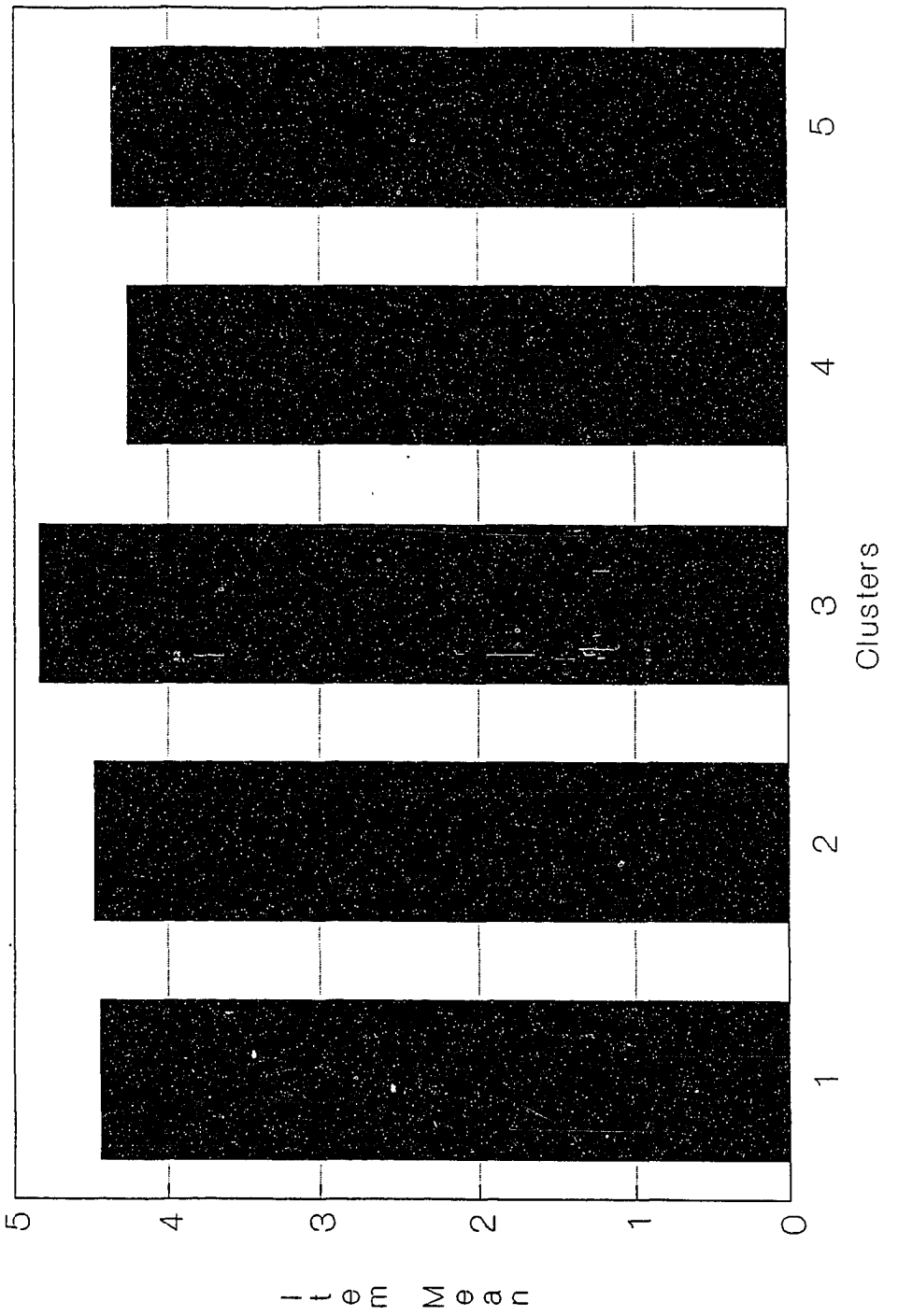

Figure II4. Mean of Teamness Index item 11 by cluster.

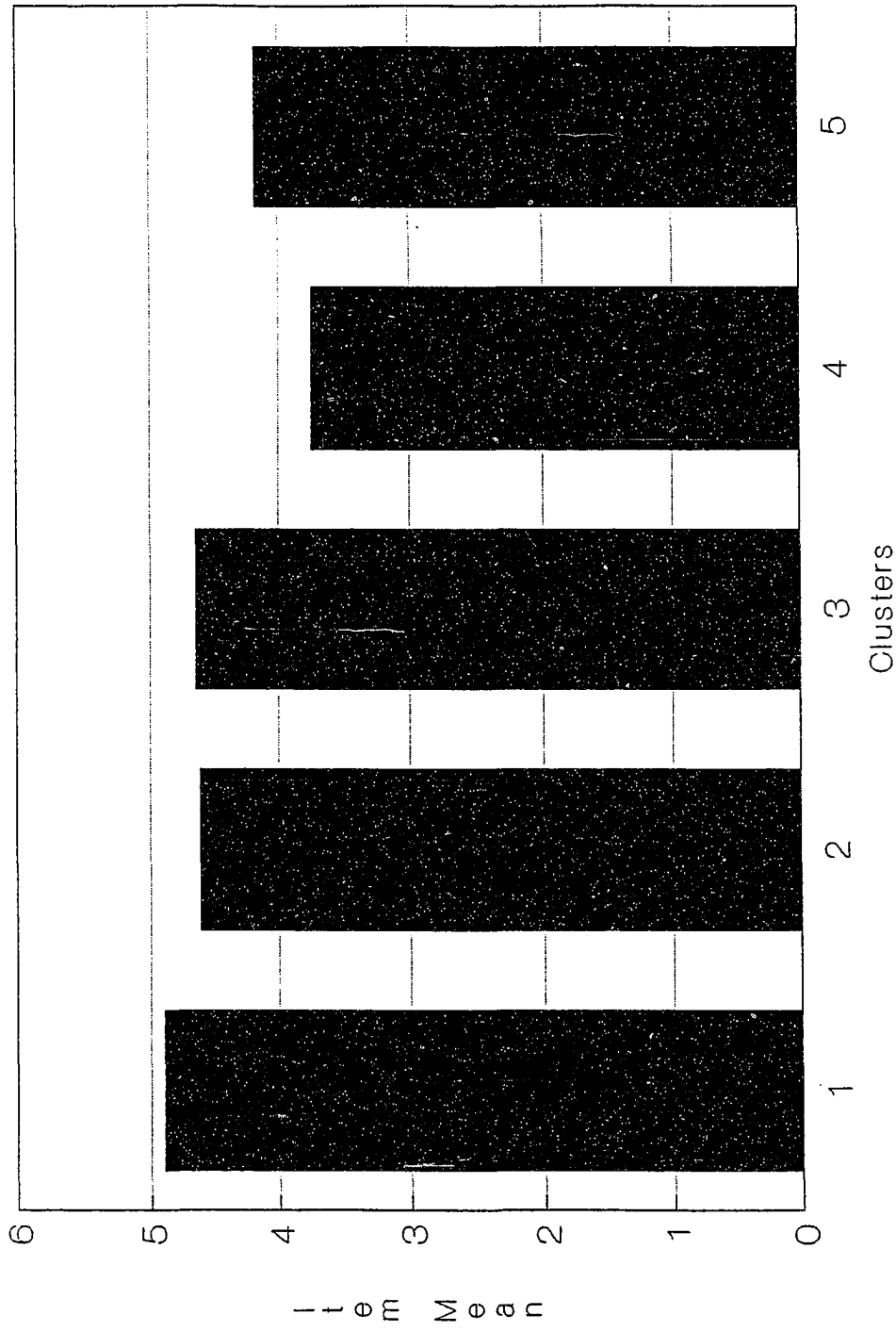

Figure II5. Mean of Teamness Index item 12 by cluster.

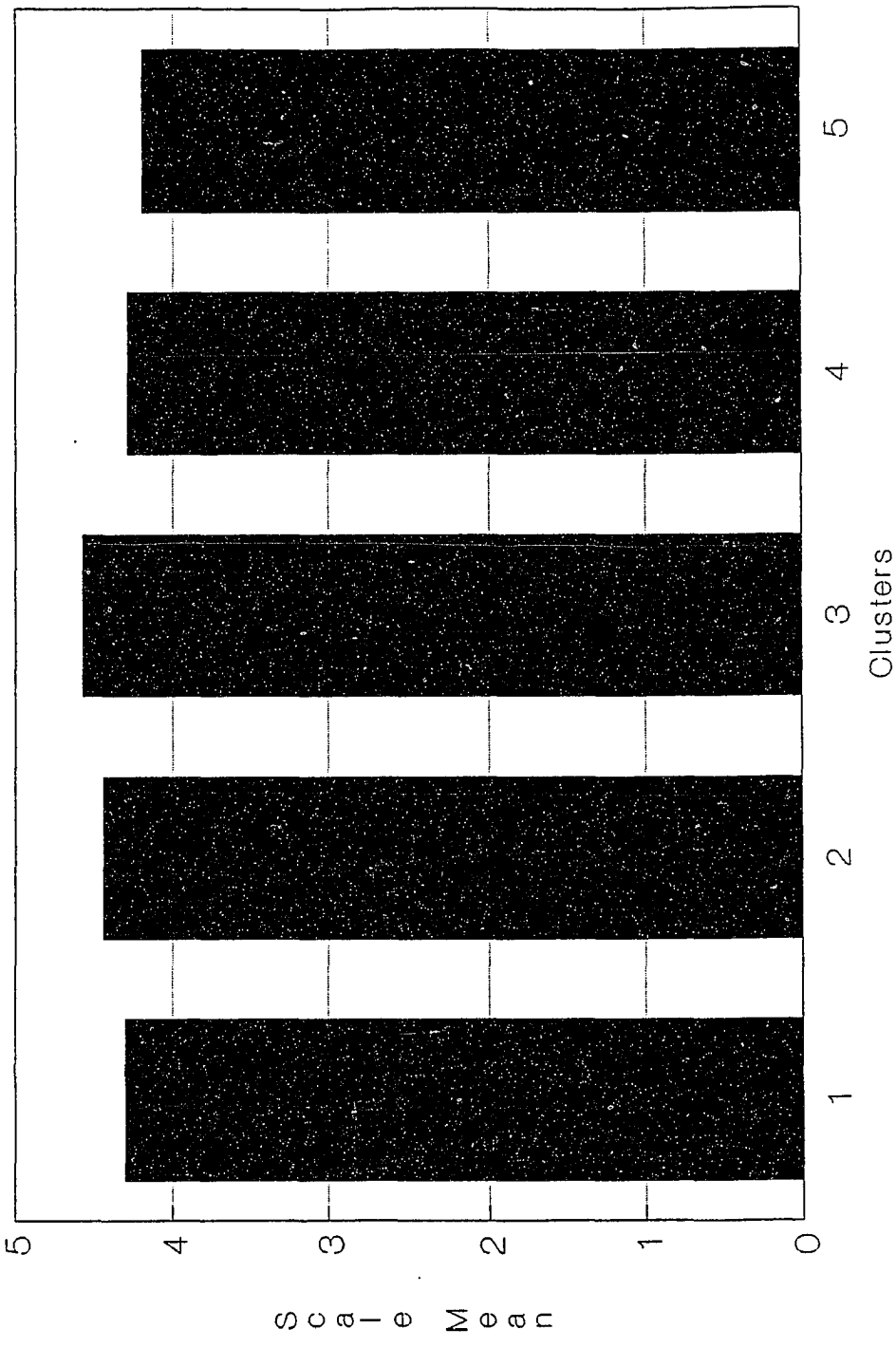

Figure II6. Mean of Teamness Index by cluster.

APPENDIX JJ

Figures Showing Post Hoc Results Related to Team Leadership Questionnaire

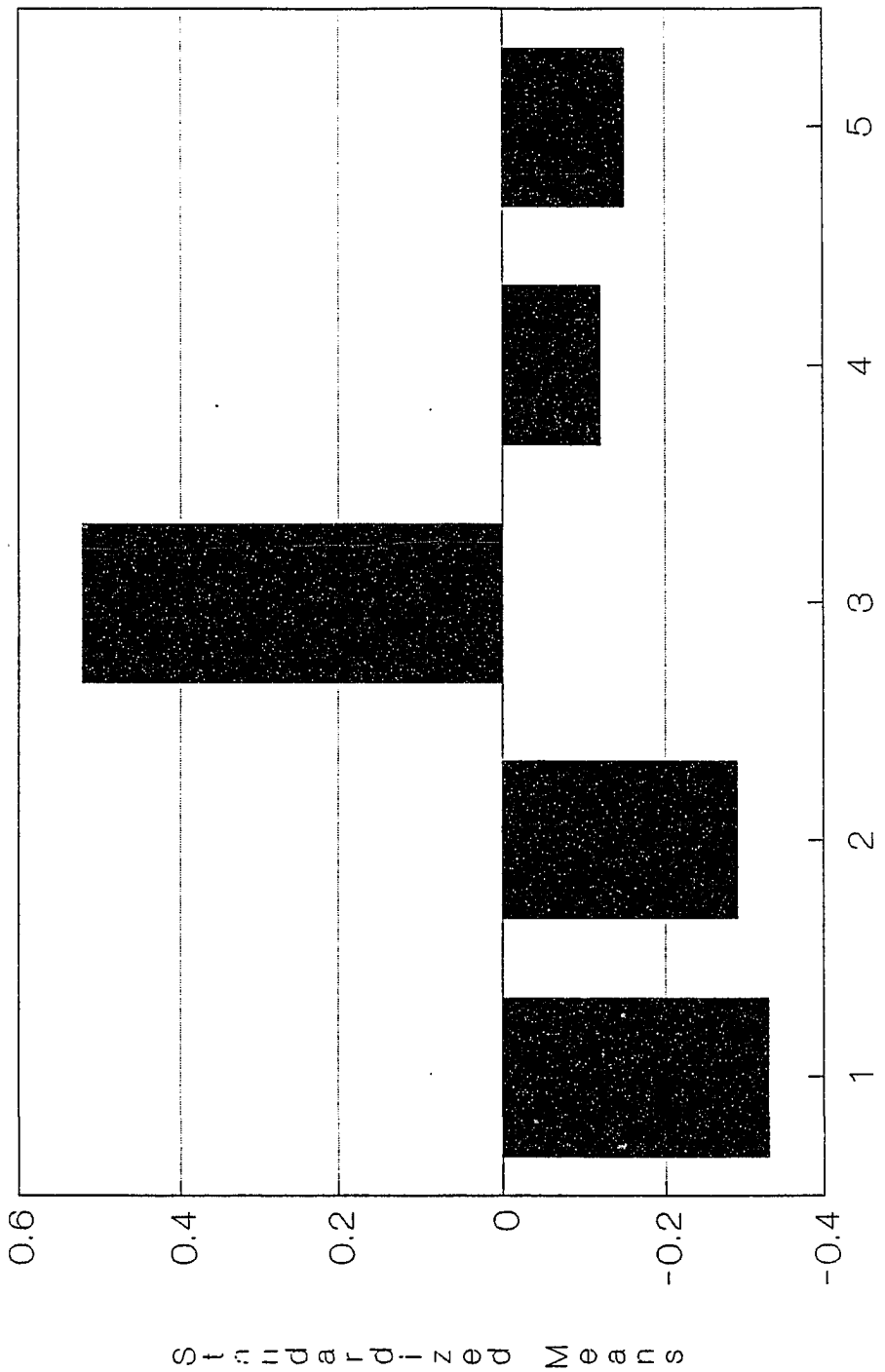

Figure JU1. Mean of TLQ factor one by cluster.

Figure JJ2. Mean of TLQ factor two by cluster.

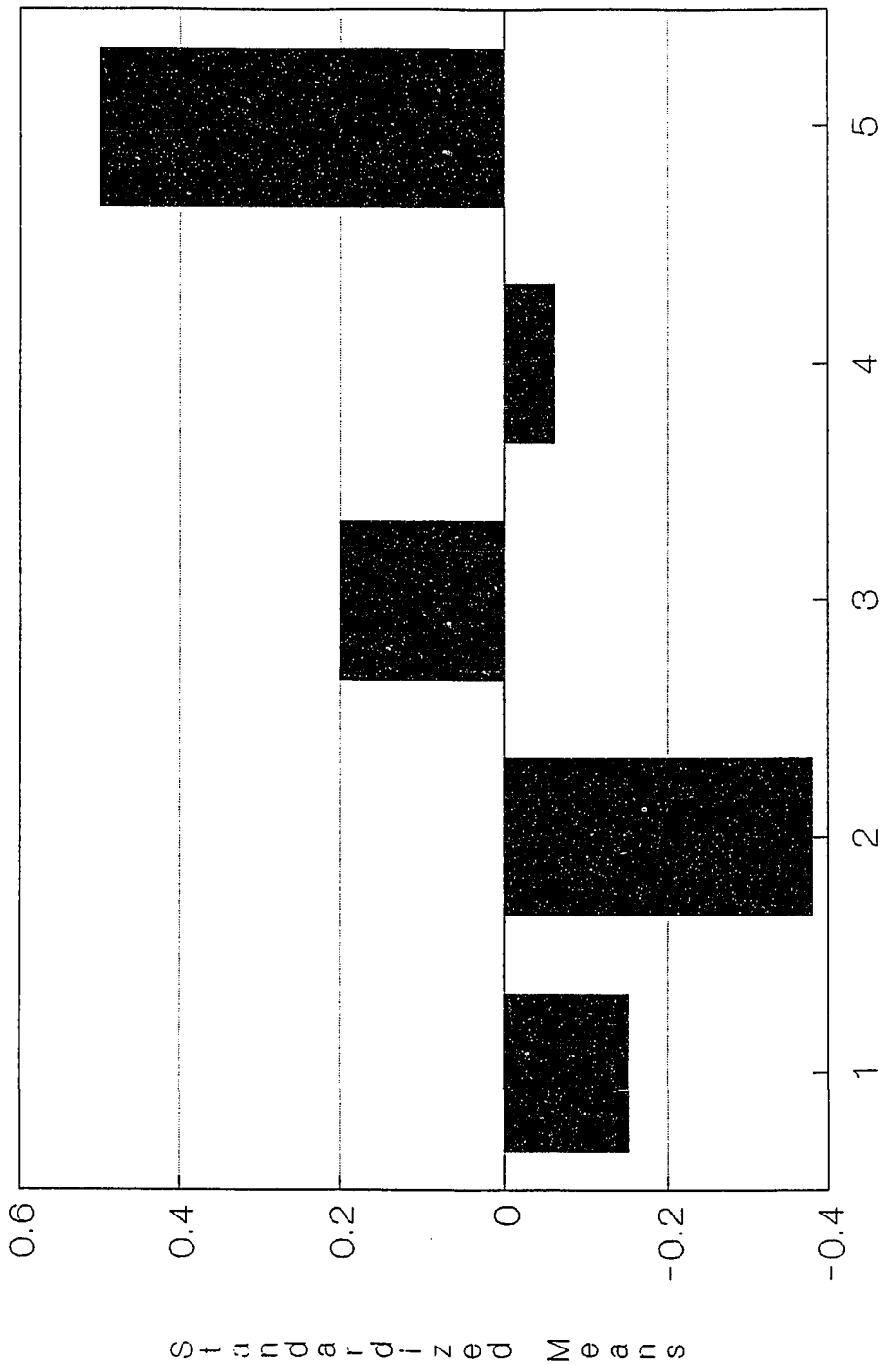

Figure JJ3. Mean of TLQ factor three by cluster.

APPENDIX KK

Figures Showing Post Hoc Results Related to the

Leader Behavior Variables from Team Leadership Interview

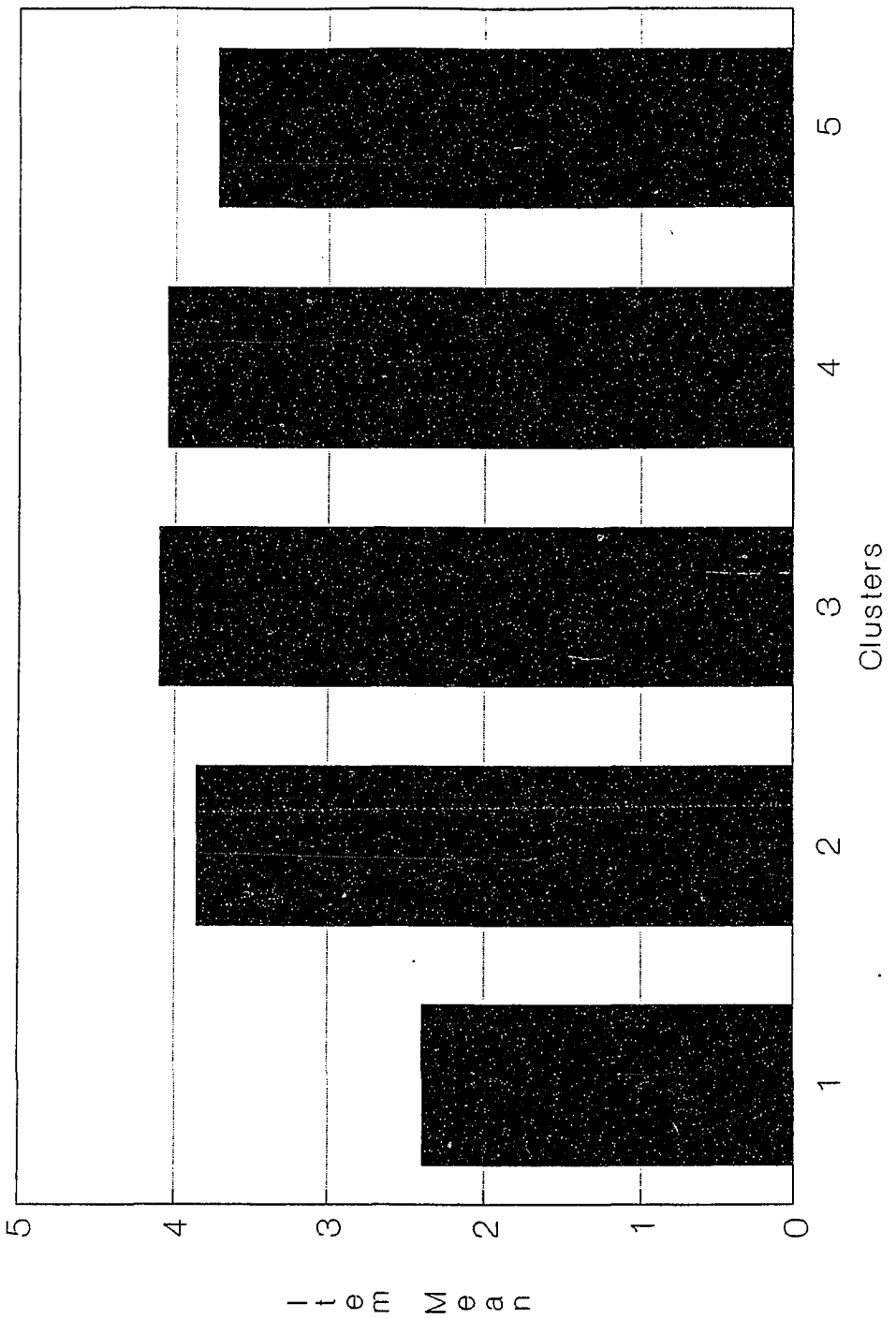

Figure KK1. Mean of the interview item regarding leader provided training, by cluster.

Figure KK2. Mean of the interview item regarding leader training, by cluster.

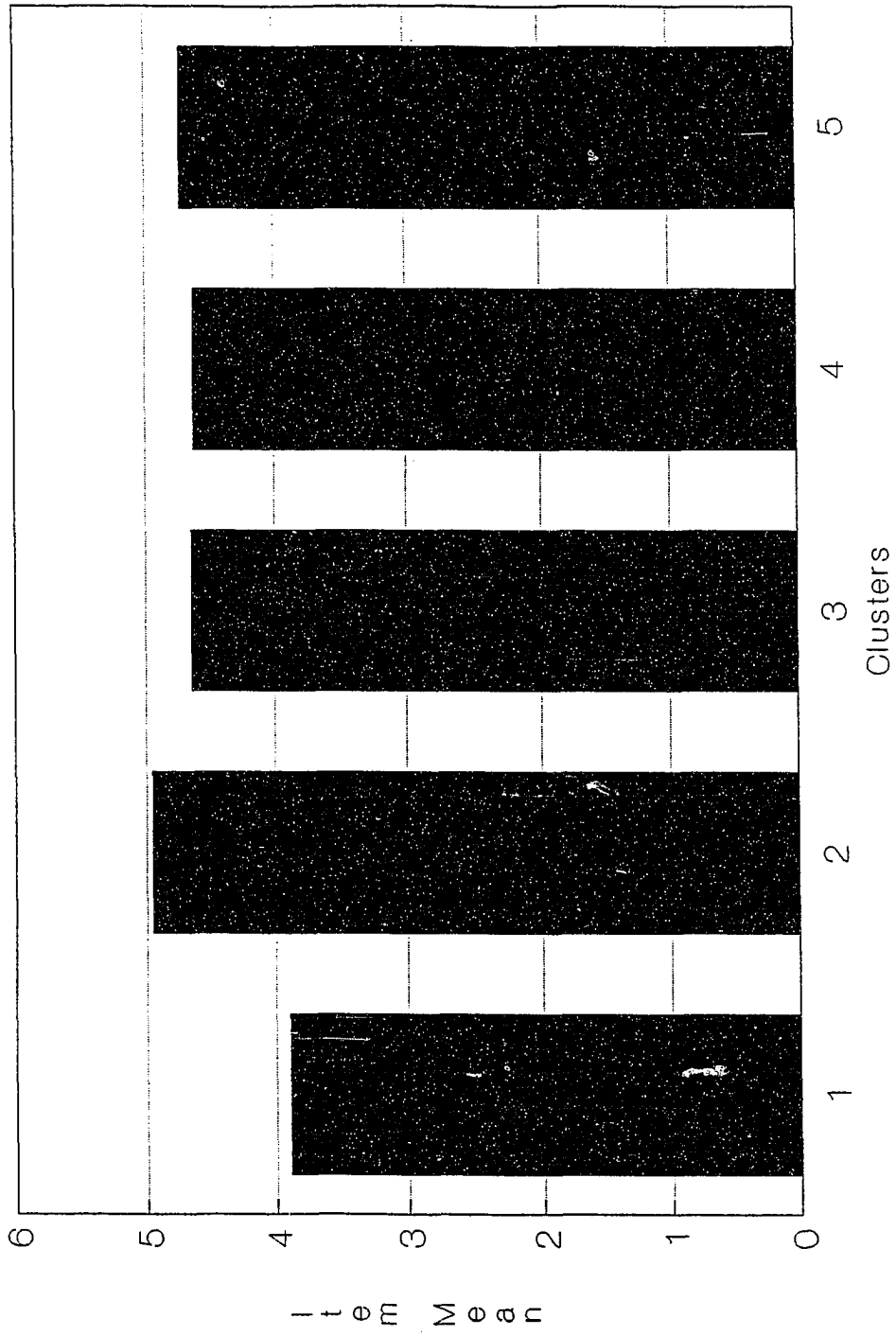

Figure KK3. Mean of the interview item regarding performance evaluation, by cluster.

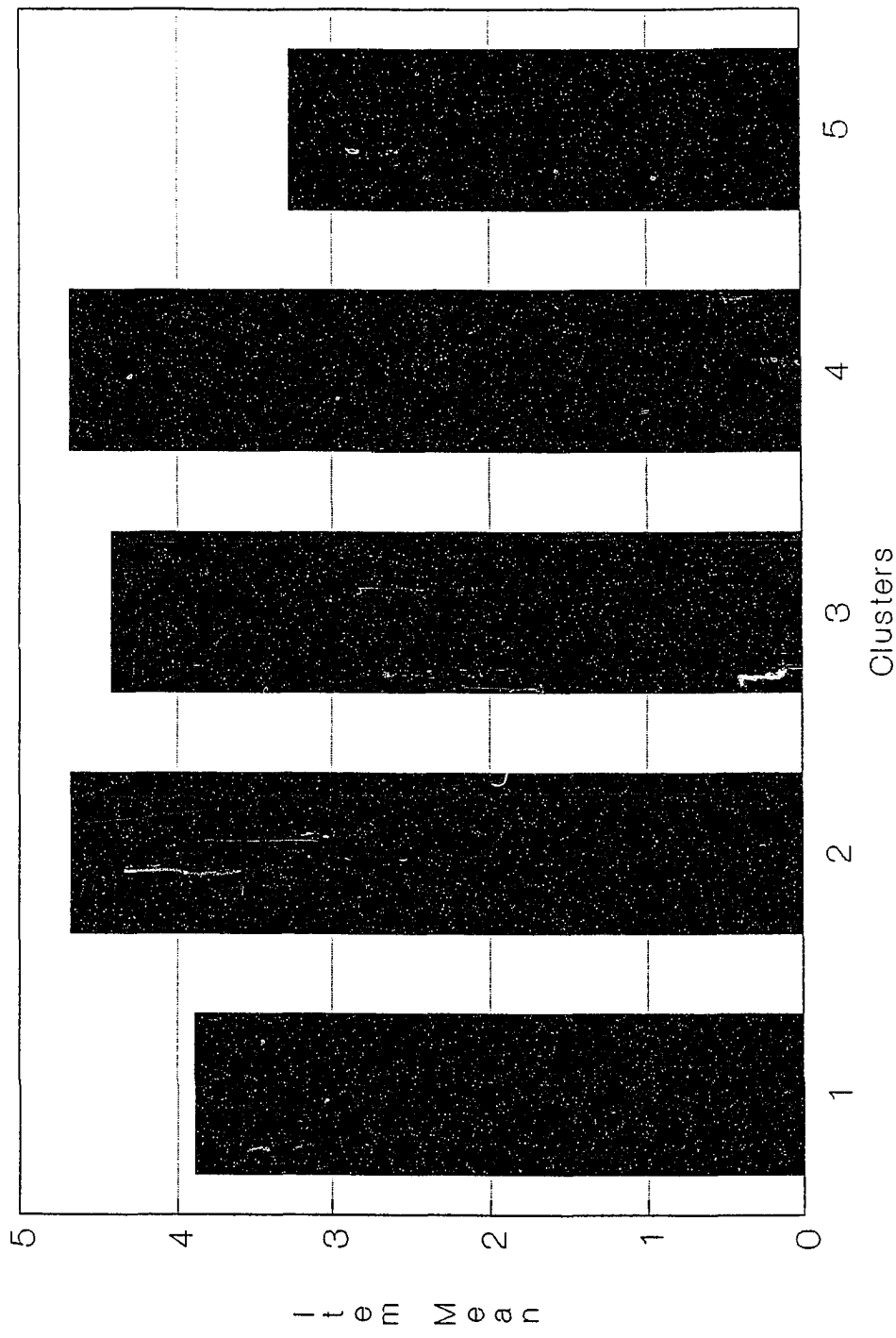

Figure KK4. Mean of the interview item regarding team recognition, by cluster.

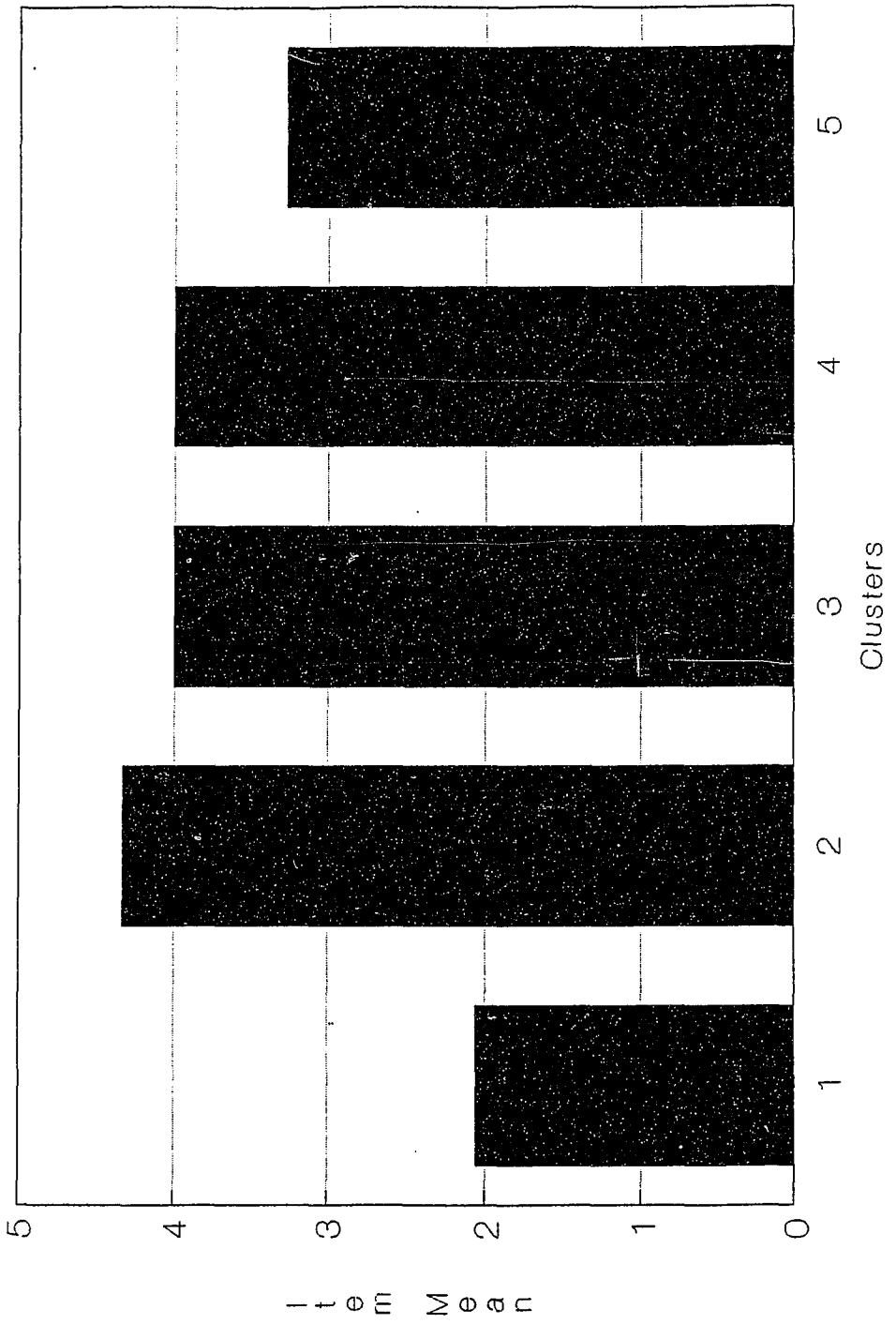

Figure KK5. Mean of the interview item regarding discipline, by cluster.

APPENDIX LL

Figures Showing Post Hoc Results Related to the Team and Leader Characteristics Variables from Team Leadership Interview

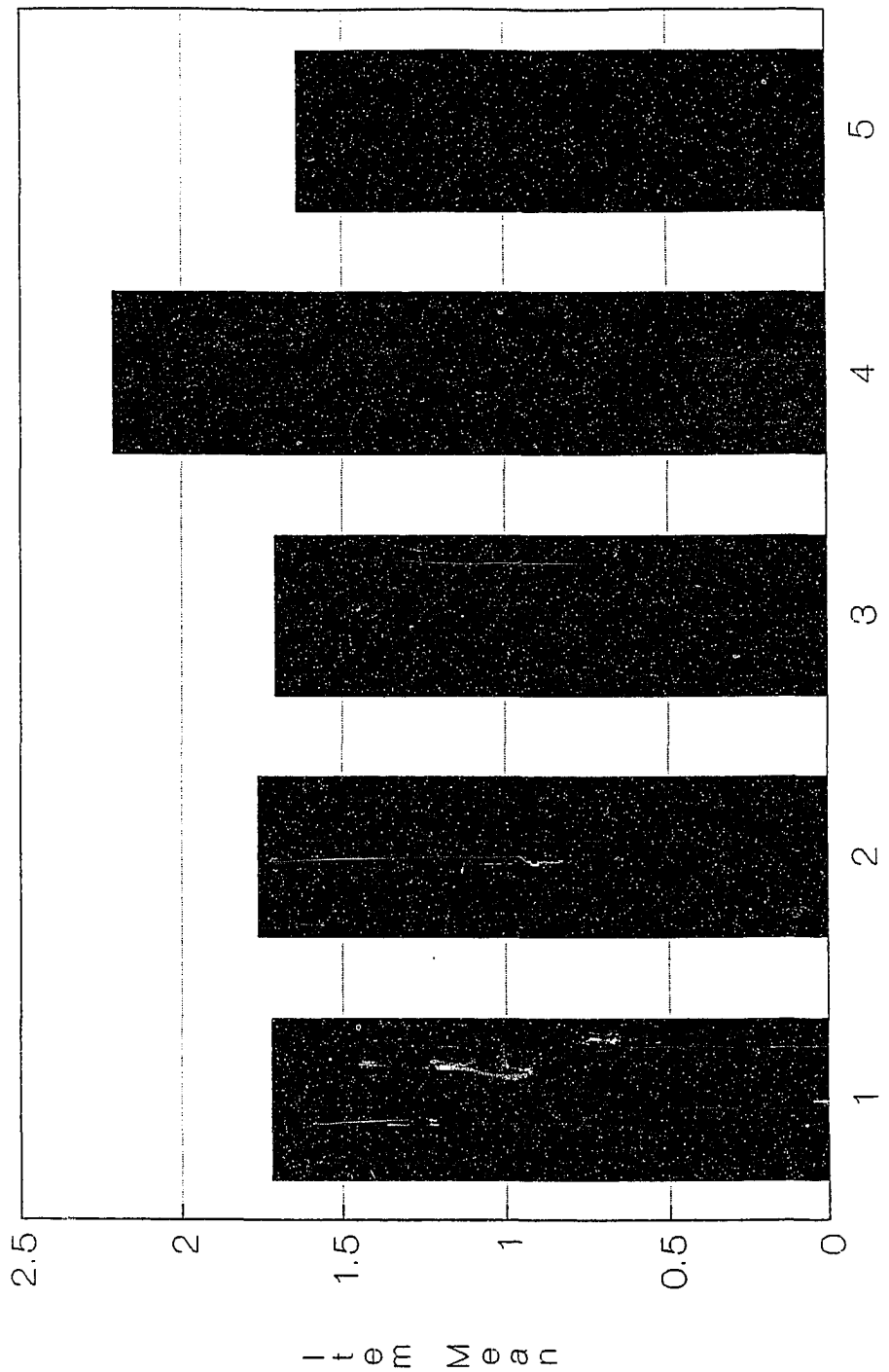

Figure LLi. Mean of the interview item regarding the importance of team vs. task skills, by cluster.

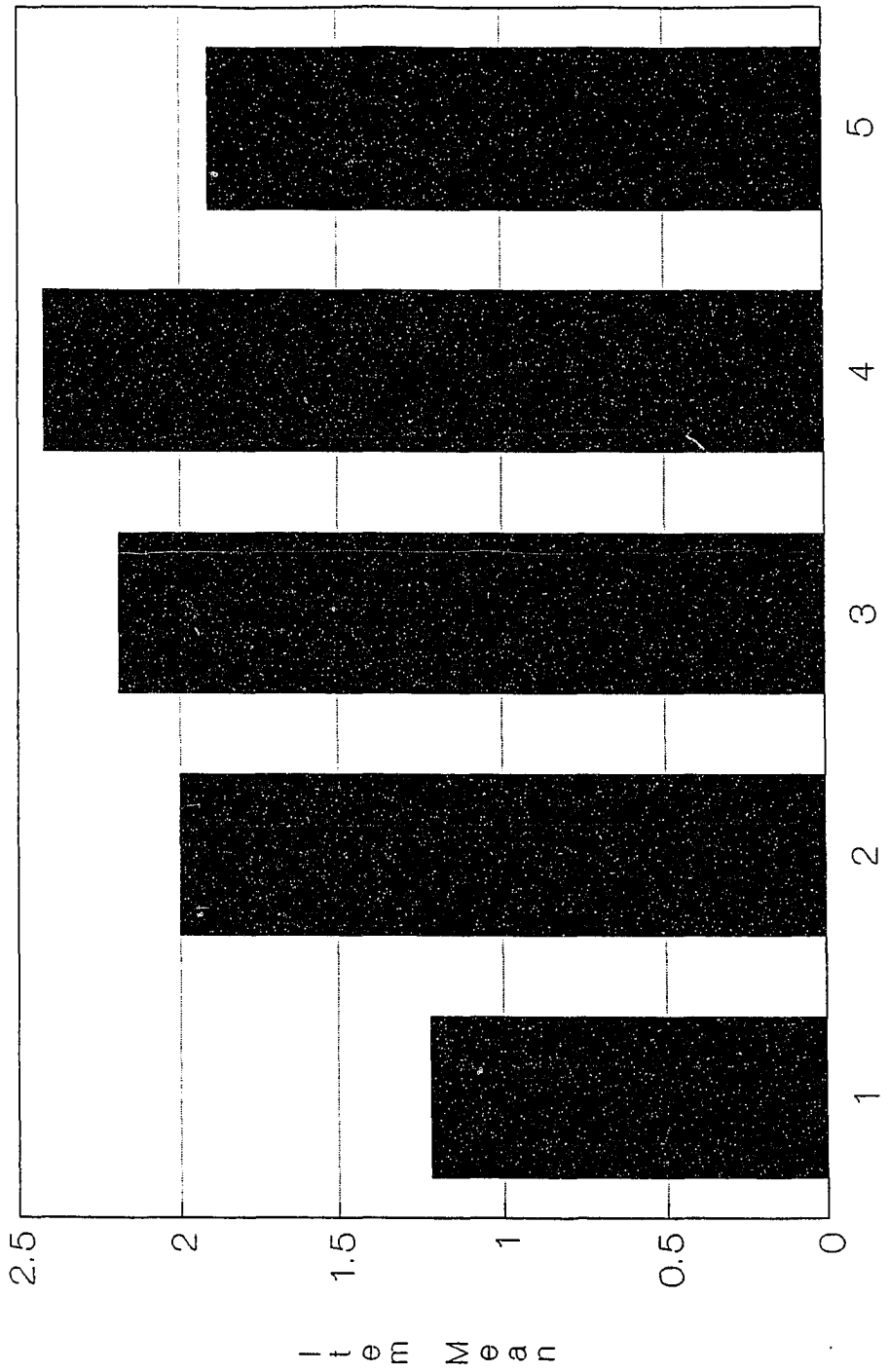

Figure LL2. Mean of the interview item regarding physical requirements of the leader, by cluster.

VITA

Brian J. Ruggeberg was born April 3, 1966 in Maquoketa, Iowa. He received his B.A. in Psychology from Cornell College, Mt. Vernon, IA in May of 1988. While at Cornell College, Dr. Ruggeberg was inducted into: Phi Beta Kappa, Mortar Board National Senior Honor Society, and Outstanding College Students of America. Dr. Ruggeberg also received the Cornell Presidential Scholarship and graduated Summa Cum Laude, with distinction in Psychology (for completing his honors thesis).

Dr. Ruggeberg received his M.S. in Psychology from Old Dominion University (ODU), Norfolk, VA in December of 1990 and his Ph.D. in I/O Psychology from ODU in May of 1996. While at ODU, he was inducted into the Honor Society of Phi Kappa Phi and the Psi Chi National Psychology Honor Society. Dr. Ruggeberg also was recognized as an Outstanding Faculty/Staff Member of ODU in 1995 for his undergraduate teaching. In addition to teaching, Dr. Ruggeberg did a wide variety of consulting for local and regional organizations.

Dr. Ruggeberg has presented eight professional papers at regional and national psychology conferences and has been an author on several technical reports related to his research on teamwork with the U.S. Navy.

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