

## **LEADERSHIP, TEAM BUILDING, AND TEAM MEMBER CHARACTERISTICS IN HIGH PERFORMANCE PROJECT TEAMS**

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### **Abstract**

Interviews of project team members about factors that lead to high levels of team performance were used to create a survey that was given to 151 project teams in the engineering and construction industry. The survey focused on project team leader behaviors, use of team building, and team member characteristics as predictors of project cost and schedule performance. Controlling for use of industry best practices, leader behaviors were found to be significant predictors of project cost performance, while neither team building nor team member characteristics were found to be significant predictors of performance.

### **Introduction**

Project teams, in which individuals from previously loosely coupled areas in an organization are brought together to perform complex or specialized tasks of a multidisciplinary nature, represent an important type of group in organizations (e.g., Cohen and Bailey, 1997). As a temporary group, a project team is formed for one main purpose: complete the assigned task by a certain date or dates, and then disband. Unlike a permanent group, it has a definite life span. The imposition of this time frame and assured impermanence are key factors driving the differences in the ways temporary group members perceive their working relationships with the group (Bryman et al., 1987).

As a result of the often temporary nature of teams, as well as the fact that individuals on teams are often drawn from different functional areas (perhaps even different organizations), project team members may have conflicting perspectives and loyalties. An important issue for organizations using project teams is how to ensure that they will achieve not only acceptable levels of performance, but also exceptional levels of performance. Accordingly, we report on our efforts to investigate the question: "What are the factors that lead to high levels of performance in project teams?"

In this research, sponsored by an international engineering industry research institute based in the U.S., interviews of members of project teams in a variety of organizations were conducted as part of an exploratory study to identify factors that are associated with high or "breakthrough" performance in project teams. In the first study, 51 individuals in eight high performance project teams were interviewed for their perceptions of the factors that led to their high performance. These interviews provided qualitative, or "anecdotal," perceptions of the things that make up a successful project team. Often these types of self-reports are used by organizations to justify maintaining current or introducing new practices for training and organizing project teams, such as performing leader training or organizing team-building courses. Rarely, however,

are these factors studied using rigorously quantitative analyses to verify the predictive ability of these perceptions.

With this in mind, we undertook a more quantitative research design in a follow-up study to test the veracity of these team member perceptions. In this second study, a pencil-and-paper survey instrument was created from the data collected in the first study's interviews and was administered to a number of different project teams within the construction industry. The objective of the survey was to validate whether or not these factors were related to higher (or lower) performance across many project teams. Another unique aspect about the data collected is that actual project cost and schedule performance data were provided by the project teams. This data allowed us to assess the impact of the factors on tangible project outcomes rather than solely on self-reported, perceptual measures of project performance.

Thus, we believe that the set of studies reported here advances work done by others in looking at team performance in at least two important ways. First, we are able to use an organizationally relevant team-level measure of outcome success; that is, cost and schedule performance. Past research has tended to concentrate on

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individual-level outcome measures, such as team effects on an individual's likelihood to leave the organization or satisfaction (e.g., Jackson et al., 1991; Jehn, 1995). Second, we utilize qualitative data collected in the first study to ground our quantitative investigation in the second study. In this way, we add an element of validity that is difficult to find in teams research (Bryman et al., 1987; Miles and Huberman, 1984).

This document summarizes the findings of the interview data collected in the first study and the data collected in the survey in the follow-on study, and is divided into four parts. First, we provide an overview of the interviews that were conducted to determine the areas of measurement for the survey and the themes that emerged from the interviews. Second, we describe the survey that was constructed based on the interview themes and the sample used to answer the survey. The third section presents the results of our analyses to predict high performance. This section provides us with indicators of the key factors that contribute to high performance in project teams. The final section summarizes our findings and proposes areas that hold the most potential for future study.

### Interviews With Industry Teams

**Data Sources.** Eight high-performance project teams in the construction, manufacturing, and military service industries were contacted. Projects included the construction of a large, continuous-production chemical facility, the installation of an organization-wide computer system, the design of a commercial jet aircraft, and the retrofit of a fossil-fuel plant. We used these teams because they were described to us by their sponsoring organizations as meeting the criteria of "high performance" teams. For example, the project teams contacted typically had completed or were projected to complete their projects 10%–15% under budget (budgets ranged from \$10 million to \$1.4 billion) and either on schedule or up to 18% ahead of schedule (schedules ranged from six months to three years). Team members typically had very diverse functional backgrounds (e.g., fluids design, structural engineering, computer science, and construction). The project teams represented 12 different organizations (in several of the project teams, multiple organizations were involved) and were located in various geographical parts of the U.S. and Canada. The different organizations represented by the team members often had competing interests, for example, industry competitors might be on the same team. Project team size typically ranged from 5–10 members, and over half of the team members from each project were interviewed.

**Informants and the Interview Sessions.** Individuals contacted for interviewing in the high performance project teams consisted of team leaders, senior assistants, lower-level managers, foremen, and laborers in the project teams. Of the 51 interviews, 48 were held face-to-face with the informants and three were conducted by telephone. Forty-seven of the interview sessions were audio tape-recorded; four sessions were not tape-recorded at the request of the informant. Interview sessions typically lasted one hour, with a range of 30 minutes to two hours.

**Step 1: Developing the Interview Guide.** A focus group was conducted with nine individuals familiar with project

teams in the construction, manufacturing, and military service industries to create a list of questions that might be suitable for exploring our research question: What is it that makes a project team a high performance project team? These individuals had been identified by their respective organizations as having a large amount of experience working with project teams and, in particular, high performance project teams. These data were used to develop our conceptual framework and what is referred to by Miles and Huberman (1984) as "prior instrumentation" to guide our data collection. The first two interview sessions were used to further refine this prior instrumentation into the interview guide that was used in subsequent interview sessions.

**Interview questions.** The interview guide was designed to be a structured question format, yet open-ended enough to let the interviewees introduce any ideas that they thought were pertinent to the discussion and to allow the interviewer to explore concepts introduced by the interviewee. Questions were worded to elicit responses from the informants in their own words that would target what they felt were key factors or characteristics associated with a project team's success.

**Step 2: Developing a Theme List.** Interview data from a subset of the 51 interviews were used to develop 18 major groupings. These major groupings were general classifications of what we felt were "broad categories of themes," where a theme was a recurrent topic of discussion or often-mentioned key characteristic of an informant's project team (Bjorken, 1989). Each broad category held within it from one to five themes. The purpose of each theme was to provide a classification label for a common idea or issue that was articulated by informants. Each theme was placed on a separate sheet on a coding form in preparation for the next step.

**Step 3: Coding the Interview Data onto the Themes.** Interview data from all 51 interviews were then coded onto the theme list. After this coding was complete, we could evaluate the importance of a theme by the number of informants who mentioned the theme in the interview sessions.

**Step 4: Reducing the Theme List.** Given our theme list, we focused on themes which had the largest amount of support based on the number of times they were mentioned by informants. This resulted in the nine themes listed in Exhibit 1. All themes that were retained were mentioned by at least one member of *each* team interviewed. The percentage listed in the exhibit represents the portion of the individuals out of the 51 interviewed who mentioned the particular theme. These themes were then analyzed in terms of their relevance to our research question of factors leading to high performance project teams and are presented in the following section.

**Themes Emerging From the Interviews.** This section summarizes and discusses the themes that emerged from the analysis of the interviews conducted with members of the high performance project teams. The percentage of respondents making comments related to each theme is given, along with examples of respondents' comments.

**Exhibit 1.** Summary of theme analysis from interviews

Theme	% of individuals
1. Team orientation: sense of belonging to a team, working well together	71%
2. Critical leader behaviors	67%
3. Team communication: frequent team meetings	61%
4. Ownership: sense that personal success is directly tied to project's success	47%
5. Location: colocation and/or physical isolation of team	43%
6. Performed team building:	
Formal	43%
Informal	43%
7. Competition: sense of competition with other or previous projects	35%
8. Rewards or bonuses for excellence: use of team perks	25%
9. High level support: sponsorship/high profile/high visibility of project	20%

*Theme 1: Team orientation: Sense of belonging to a team, working well together.* This theme represents a broad feeling of being part of a team and enjoying being part of the team (71% of respondents gave comments related to this theme). Comments ranged from “you [are] part of a team so you can’t let others down” to “being part of the project is a rush.” There were frequent references to team members being energetic, excited, hard-driving, task-committed, and enthusiastic, and that the team interactions were fun and “led to synergy—more gets done better—things don’t fall through cracks because people are working together.” Some members commented that these feelings of team orientation were stronger when the teams had fewer members.

Generally speaking, being happy and excited about being part of a team can result from the prestige felt by being a member of the team (given that the teams are high-performance). The synergy that comes from having this orientation is indicative of the factors traditionally associated with well-functioning groups: interpersonal interaction, liking, etc. Having less of a feeling of team orientation in a big team may be the result of a bigger team being harder to cognitively identify as a “team.”

*Theme 2: Critical project manager/leader behaviors.* The volume of comments from team members on the impact of behaviors of the project team leader on the performance of the project team indicates that team leader behaviors are perceived to be highly influential (67% of respondents gave comments related to this theme). Based on these comments, the most important role of the project team leader appears to be to communicate the desired goals and values of the team—the team leader “portrays these objectives ... [and] it percolates through,” works to “realign attitudes,” “fosters tremendous work ethic,” and “forces collegiality and communication” among members. A secondary role of the team leader, but still important, is to keep members informed of the status of the project. As a result of the size of some projects, team members in some project teams often can only see or cognitively identify the entire project through the information provided by the team leader.

*Theme 3: Team communication: Frequent team meetings.* This theme concerns the regularity with which meetings were held for members of the project team and with external parties (61% of respondents gave comments related to this theme). A meeting of some type was usually held at least weekly with core team members and regular status meetings were held with the entire team. With colocation of team members (a theme discussed later), it is likely that spontaneous meetings occurred amongst team members. In fact, in one project team several members spoke of the understanding that it was their job to “eavesdrop” on meetings held in their common area and to join them if they had something to offer. These meetings generally were used to share information and solve problems of a technical nature, but also served to provide a forum where the team members could interact socially with each other.

A common feature of many of these meetings was the “status report” that told team members how the project was doing in relation to the benchmarks—usually a past project with which the team was in competition. In addition to regular meetings, special meetings were used to align team members’ goals and priorities together with the project-task goals and priorities. Informants reported the use of “kickoff meetings” at the beginning of the project to introduce project goals to team members, and occasional “alignment sessions” held during the project to realign members with these goals.

*Theme 4: Ownership: The sense that personal success is directly tied to project's success.* This theme generally was articulated as a sense of being with the project from beginning to end (a sense of ownership) and a sense of the goals of the project being the goals of the individual (47% of respondents gave comments related to this theme). Numerous comments were made about the high performance project teams being unusual in that almost all of the project team members had been with the project since its inception and that a result of this was that “people were willing to get involved in all aspects to get the job done; people didn’t mind doing this.” As well, being with the project from beginning to end resulted in a “consistency of the intent” that seemed to drive project success. Alignment of

goals for success between individuals was evidenced by comments such as, “people [were] concerned with the overall project, not just themselves on paper ... [they would] spend the necessary hours to make the project a success” and “[we] understand we’re all after the same goals.” Internalization of group goals appears to be a key factor in the team members’ desire to seemingly do whatever it takes to make the project succeed.

*Theme 5: Location: Colocation and/or physical isolation of team.* In a number of the project teams interviewed, members reported that being physically located in the same office with all or a majority of members of the project team (colocation) was a contributing factor to the success of the team (43% of respondents gave comments related to this theme). A number of reasons were given, ranging from a need to facilitate communication necessary for project execution and restricting functional managers’ ability to take them temporarily off the project, to enabling “camaraderie, cooperation, [and] accommodating team spirit.” Several of the groups were also physically isolated from the rest of the organization, and this, in conjunction with numerous team events, was believed to heighten the development of “team spirit.” Being physically located together also taps the “proximity” factor traditionally associated with group formation and makes it easier for interpersonal interactions between team members to occur.

*Theme 6: Performed team building.* Virtually all the project teams reported using either formal team building (organized seminars, off-site or on-site) and/or some form of informal team building (group events, lunches, casual days, etc.). Forty-three percent of respondents gave comments related to formal team building and 43% of respondents gave comments related to informal team building. It is interesting to note that while not all of the team members interviewed reported attending formal or informal team-building sessions for the project team, there did not seem to be any less of a sense of team orientation among the teams that apparently did not engage in explicit team building. It is possible that the environment of a good project team naturally contains within it the characteristics that team building seeks to build, and that the “sense of team orientation” is itself an indicator of such an environment.

*Theme 7: Competition: Sense of competition with other or previous projects.* Informants reported that competition in the form of frequent comparisons with other projects was important for at least two reasons (35% of respondents gave comments related to this theme). First, a number of the project teams were being evaluated against the performance of past teams or teams running in parallel to them. Competitive comparisons thus provided a practical check as to how they were doing relative to their benchmarks. A second reason was that because the teams were generally doing well relative to their competitors (recall that these are high performance teams), they used the competition to reaffirm that they were indeed a high performance team. As one informant put it, a result of frequent comparisons with a previous project (that they were ahead of) was that “we always knew what ‘ahead’ means.” This type of comparison could be interpreted as creating distinctiveness for

the project team and increasing the salience for the out-groups by highlighting the differences on the comparison dimension. Distinctiveness and prestige for the project team are also enhanced by emphasizing that their performance makes them unique; e.g., the most salient measure of success for one member was that “we’ve succeeded where others have failed.”

*Theme 8: Rewards or bonuses for excellence; use of team perks.* Rewards or bonuses for excellence on the project were reported by 25% of respondents. A common comment was that it was difficult to give these rewards on a team basis and often the rules “had to be bent just a little” to do so. Rewards often were in the form of plaques mounted in the team’s office space or in the organization’s common area, or were given in the form of cash bonuses. Rewards were usually reserved for performance at critical junctures in the project and not for overall final project success; i.e., the rewards were given during the project, thus serving as a motivator for future performance on the project. While most rewards were offered by the project team’s organization, some rewards were offered by the client—these were usually in the form of cash milestone-completion bonuses that were given to the organization rather than team members, although in at least one case this bonus was shared with team members.

Some team members also reported the use of “token” perks by the project team. These were not given out contingent on individual performance, but were given to all members (or randomly selected members) just for being a member of the team. These perks included hats and t-shirts, donuts and coffee, lunch with the project leader, BBQ’s, etc. As well, there were numerous events such as a “Kid’s Day,” baseball games, and fishing trips. The use of recognition devices such as t-shirts and hats with the project team logo on them serve to further increase the distinctiveness of the project team—“only Project X team members will get a Project X hat.”

*Theme 9: High-level support or sponsorship/high profile/high visibility of project.* A number of respondents (20%) indicated that their project had high visibility and high level support and that as a result the project had greater access to resources and was more carefully planned and executed than a project not having this visibility. Because of the project’s high visibility, team members felt that they were more willing to give the project the extra attention to ensure its (and their) success as it is more important (for one’s career) to do well on a high visibility project than on a low visibility project. These factors in turn were believed to contribute to the success of the project.

### Developing the Survey Instrument

From these themes, questions were constructed for the paper-and-pencil survey. This was done using the previously mentioned focus group members who were presented with the results of our theme analysis. The focus group helped us use phraseology for the questions that would be appropriate for project teams in the construction industry. For these measures, respondents were instructed to focus on their project team and were asked to rate “To what extent do you think your team [or leader or team members], overall, exhibited the following characteristic (1 to 7, where 1 = not at all, 7 = to a great extent).” Samples of the questions used are shown in the Data Analysis section.

In addition to these items, several additional scales were included: objective measures of project performance, two perceptual measures of project performance, a measure for project image, and measures for use of best practices. These measures are discussed below. A copy of the entire survey is available from the authors.

**Measures of Project Performance.** Two types of measures of project performance were used. The first type of measures used budget and schedule performance data for the projects—these are “objective” performance data because they are actual dollars and dates that have been verified where possible (for example, from respondents who reported on the same project). The second type of measures used “subjective” indicators of project performance—these indicators are subjective in that they ask the respondent how well they *thought* the project performed, absent any “hard figures” such as “percentage under budget” or “days over/under schedule.”

Respondents reported both the initial predicted cost (budget) and the actual total cost (or anticipated cost if the project was not complete). Cost growth (a standard measure of project performance in this industry) was not provided by the respondent; rather, it was calculated by the researchers. The formula used was  $\text{cost growth} = (\text{actual total cost} - \text{initial predicted cost}) / \text{initial predicted cost}$ . For this measure, a negative value indicates that the project was completed under budget (a desirable outcome).

Respondents reported the project begin-date, the scheduled project end-date, and the actual project end-date (or the anticipated end-date if the project was not complete). The initial predicted duration was calculated by the researchers as the length of time between the project begin-date and the scheduled end-date. Schedule growth (a standard measure of project performance in this industry) was not provided by the respondent; rather, it was calculated by the researchers. The formula used was  $\text{schedule growth} = (\text{actual total duration} - \text{initial predicted duration}) / \text{initial predicted duration}$ . For this measure, a negative value indicates that the project was completed ahead of schedule (again, a desirable outcome).

For the perceptual measures, respondents were instructed to focus on the *project overall* and were asked to rate “To what extent do you think your project, overall, was a high performance project” (1 to 7, where 1 = not at all, 7 = to a great extent). Respondents were then instructed to focus on the *project team* and were asked to rate “To what extent do you think your project team, overall, was a high performance project team” (1 to 7, where 1 = not at all, 7 = to a great extent).

**Image.** A number of the themes appeared to touch upon the distinctiveness and salience of the team to the team members. For example, the feeling of competition between projects is an example of “in-group” versus “out-group” feelings. The importance of the team leader may be another indicator that a well-defined team boundary leads to the perception of a higher performance team: the team leader provides the most visible indicator of the project team’s values and practices that potentially make it distinct from other project teams. The team leader can invoke comparisons with other projects to increase other projects’ salience as “out-groups” and thus reinforce

awareness of the “in-group” project team. As well, a prestigious team leader can bring prestige (or the perception of prestige) to a project, thus enhancing the image of the project and the members’ identification with the project.

Similarly, image has been discussed as a feature that might enhance the degree to which individuals feel a part of an organization (Dutton, Dukerich, and Harquail, 1994). Individuals assess how outsiders perceive the adequacy or “goodness” of the groups or organizations to which they belong (Luhtanen and Crocker, 1992; Dutton and Dukerich, 1991). To the extent that we believe others see our group or organization as good or worthy, we feel good about being a part of that group or organization. Thus, feeling that one is part of a prestigious project team as perceived by others (i.e., the project and the project team each have a favorable image) may influence how much effort one is willing to expend, as well as how cooperatively members work together.

Because of the potential usefulness of this variable and because image has been previously linked to perceptions of team characteristics, leader characteristics, and team performance, this was included in the survey as an additional predictor of perceptions of performance measures. Measures of image attempted to capture the respondent’s perceptions of what others thought about his or her project by asking questions such as “Overall, was this project considered good by others?” Respondents were asked questions about their perceptions of the project’s image using measures developed by Luhtanen and Crocker (1992).

**Use of Best Practices.** Because the teams that would be responding to the surveys were construction industry teams, it was necessary to control for the use of best practices by these teams. Without these control variables, we could not separate the amount of success due to our study’s variables from the amount of success due to the use of industry best practices. A total of 24 best practices were listed in the survey, which included use of total quality management and project change management procedures and clearly defining project scope. These best practices were provided by a sponsoring institute (these are more completely outlined in Dukerich and Ammeter, 1998). The individual practices include safety and zero accident techniques, schedule compression, clear project goals and objectives, project partnering in the form of team building, high-level sponsorship, partnering for strategic alliances, planning for startup, work packaging, formal documentation procedures, etc. As is indicated in the data analysis section, these individual best practices evolved into three classes of best practices.

**Survey Method and Respondents.** Surveys were sent to Data Liaison Representatives (DLR) at the 81 member companies of the sponsoring institute. Each DLR was sent three “project-sets”—each project-set contained instructions to forward the project-sets to project team leaders in their organization along with four surveys to be distributed to members of a project team. Participants were given the option of receiving a summary of the survey’s results. A business-reply envelope was provided for return of the survey. A small number of surveys were returned by facsimile machine.

There were 1112 surveys sent out. Two hundred and seventy-eight completed surveys were returned for a response

rate of 25%. A total of 151 projects could be identified; 84 of these projects had a single respondent report on the project and 67 projects had multiple respondents report on the project. Respondents were instructed to think of the “core” or “leadership” team for their project. The median project team size was 10 persons, with a range of 3–40 persons.

The average reported age of the respondents was 45.6 years; 96.7% of those responding were male. The majority of respondents (56.7%) had a bachelor's degree (most often in a branch of engineering), and a large number (26.9%) had a graduate degree (most often in engineering or business administration). Thirty-eight percent of respondents indicated that they were the project manager, 15%—project engineer, 13%—construction manager, 9%—project controls manager, 8%—lead discipline engineer, 3%—production startup manager, 2%—procurement manager, 1—quality assurance/quality control manager, and 11% had some other position or did not indicate a position. Sixty-one percent of those responding to this question indicated that they were the team leader at some point on the project. The average number of years they had been working in a “project team environment” was 13.9 years.

### Data Analyses

Our survey measured several sets of potential predictors of high performance in projects and teams. For each set of potential predictors we used exploratory factor analysis to group these predictors into logical sets or factors. These factors represent the key characteristics that respondents identified as being present in their project team or project leader. They are reported below with their corresponding reliability indices (Cronbach's alpha). Readers interested in the factor analysis method and Cronbach's alpha reported in the following analyses are directed to Hair, Anderson, Tatham, and Black (1998).

**Team Characteristics and Behaviors.** Two factors emerged as reliable and valid from the analysis of the responses to questions about team characteristics and behaviors. The items that clustered to create the first factor appeared to be related to the consequences of team identification, e.g., one of the items loading on this factor, “a sense that their success was tied to the project's success,” is very similar to one of the items in the Mael and Ashforth (1992) identification measure. Items such as “feeling enriched” or “having a sense of belonging to the team” are potential consequences of identification as are high expectations, motivation, and a willingness to take risks. Being aware of the project's goals and sharing these goals with other members reinforces the salience of the team (or, is reinforced by the salience of the team). This item can be thought of as a team-level alternate to the Mael and Ashforth (1992) measure of organizational identification. This factor was named “Team Member Characteristics.” Samples of the items in this factor are:

*Factor: Team Member Characteristics (alpha = 0.96)*

1. A sense of belonging to the team
2. A sense of ownership of the project
3. A sense that their success was tied to the project's success
4. A sense of competition with other projects

The items that clustered to create the second factor appeared to be related to team formation and maintenance

behaviors and this factor was named “Team Building.” Samples of the items in this factor are:

*Factor: Team Building (alpha = 0.86)*

1. Team participation in *formal* “team building”
2. Team participation in *informal* “team building” (e.g., team get-togethers, lunches, etc.)
3. Team members had opportunity to receive rewards for good work (e.g., bonuses, recognition, etc.)
4. Team recognized and celebrated successes

**Leader Characteristics.** One factor emerged as reliable and valid from the analysis of the responses to questions about leader characteristics and behaviors. The items that clustered to create this factor appeared to be a listing of (presumably) beneficial behaviors of the leader toward the team members. This factor was named “Leader Behaviors.” Samples of the items in this factor are:

*Factor: Leader Behaviors (alpha = 0.97)*

1. Communicated the project's goals
2. Aligned team members' goals with the project's goals
3. Fostered a feeling of empowerment among team members
4. Fostered a good work ethic

**Image.** The image measures of Luhtanen and Crocker (1992) were found to be statistically reliable in our sample (alpha = 0.77).

**Best Practices.** Factor analyses yielded three best practice factors: planning and project controls, scope management and project alignment, and quality practices. These three factors were entered as control variables into the regression analyses described below.

**Regression Analyses.** Four measures of performance were tested. The two perceptual measures were (1) the responses to “To what extent do you think your *project* was a high performance *project*?” and (2) “To what extent do you think your *project team* was a high performance *project team*?” The two “objective” measures of performance were budget performance and schedule performance. Consistent with previous research in this area, we included a variable that indicated if the respondent was the team leader, otherwise the importance of leader behaviors could be inflated if the leaders tended to respond differently to the questions than the non-leaders. A summary of the results of this analysis is presented in Exhibit 2. All of the models' adjusted  $R^2$ s reported are significant, indicating that the set of predictors we used explained a significant amount of variance in the dependent variables.

**Perceptions of Project and Team Performance.** For predicting perceptions of *project* performance, we found that leader behaviors and project image were significant and positive predictors. These same variables were also significant and positive predictors of *project team* performance. Member Characteristics was found to be an unstable predictor, as removing any of the other predictor variables caused the significance and sign of the Member Characteristic beta weight to change drastically. For this reason, we cannot reliably interpret the effect of this variable in any of the models. The scope management and project alignment factor was a



**Exhibit 2. Regression Analyses**<sup>1</sup>

	Model 1: Perceptions of Project High Performance	Model 2: Perceptions of Team High Performance	Model 3: Cost Growth <sup>2</sup>	Model 4: Schedule Growth <sup>2</sup>
Standardized Beta Coefficients for Predictor Variables:				
Leader Behaviors	***0.32	*0.18	***-0.39	0.10
Team Building	0.00	0.04	-0.05	-0.05
Team Member Characteristics <sup>3</sup>	*0.162	***0.49	*0.254	-0.19
Project Image	***0.29	**0.14	-0.15	-0.05
Planning and Project Controls	0.00	-0.01	-0.02	*-0.25
Scope Management and Project Alignment	*0.17	0.06	*-0.23	0.14
Quality	-0.03	0.01	0.06	*-0.23
Respondent = Leader	0.00	0.04	0.06	0.00
Adjusted $R^2$	0.59	0.63	0.20	0.20
Model degrees of freedom	230	230	197	205

1. Significance Tests: \*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$

2. For Cost Growth and Schedule Growth a negative beta coefficient indicates that an increase in a predictor variable (e.g., Leader Behaviors) is related to projects coming under budget or beating schedule; positive coefficients indicate that increases in the predictor variables were related to projects being over budget or not meeting the schedule.

3. The beta coefficient for Member Characteristics in this regression equation was found to be unstable (entering or taking out one or more other predictor variables caused its value and significance-level to change drastically). This may be due to the high correlation between Member Characteristics and the other predictor variables. For this reason interpretation of tests indicating a relationship between member characteristics and any of the dependent variables.

significant predictor of perceptions of project high performance; no other best practice factors were significant.

#### **Objective Measures of Budget and Schedule Performance.**

The same set of predictor variables noted above were used to predict the objective measures of budget and schedule performance (that is, cost growth and schedule growth). It is important to note that the measures of budget and schedule performance were scaled differently than the measures of perceptions of performance; for these analyses we attempted to find out which predictors were related to the projects that came in under budget or beat the schedule. Thus, positive and negative beta coefficients take on a new meaning. A *negative* beta coefficient indicates that an *increase* in a predictor variable (e.g., leader behaviors) is related to *projects coming under budget or beating schedule*; *positive* coefficients indicate that *increases* in the predictor variables were related to *projects being over budget or not meeting the schedule*.

Leader behaviors were significant predictors of cost growth performance (in the expected direction, that is, an increase in the incidence of leader behaviors was associated with an increase in budget performance). The scope management and project alignment factor was a significant predictor of perceptions of cost growth; no other best practice factors were

significant. For predicting schedule performance, only the planning and project controls and the quality best practices factors were significant. None of the leader, team building, or team member characteristics were significant predictors of schedule performance.

#### **Conclusions**

Using qualitative interviewing and focus group techniques to explore factors affecting project performance, we were able to identify nine themes as potentially useful predictors of project team performance. Using a survey to test and validate the measures we created from these candidate predictors, we found that only leader behaviors was a significant predictor of budget performance (cost growth) and was also a significant predictor of the perceptions of project and team performance. Neither team building nor team member characteristics were found to be significant predictors of cost growth and schedule growth. The project image factor was a significant predictor of perceptions of project and project team performance. Thus, only the leader behavior factor had the dual benefit of being a significant predictor of measures of perceptions of performance *and* one of the measures of objective performance. This suggests that leader behavior had a powerful and pervasive role in determining the feelings of success and actual success of

project teams. It is noteworthy that the reported contributions of team building and team member characteristics to performance in the first study were not found in the second study, suggesting that their effects may have been dependent on the climate set up by the leader. It is suggested that the interaction between leader characteristics and team-building/team member characteristics would be a fruitful area of study for future research.

Summarizing the dual-study nature of our project, in many cases the survey data supported the anecdotal reactions we gathered in the interview phase of the research. Project teams that achieved breakthrough performance were characterized by strong project leadership and team members who believed that others thought their project to be worthwhile. To the extent that those who set up project teams can focus on the leadership role, as well as provide ways to develop a favorable project image, such teams may achieve results superior to those that do not have these characteristics.

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### References

- Bjorkegen, D., "It Doesn't Have To Be That Way," paper presented at the *Organizational Behavior Teaching Conference*, Columbia, MO (1989).
- Bryman, Alan, Michael Bresnen, Alan D. Beardsworth, et al., "The Concept of the Temporary System: The Case of the Construction Project," *Research in the Sociology of Organizations*, 5 (1987), pp. 253–283.
- Cohen, Susan G., and Diana E. Bailey, "What Makes Teams Work: Group Effectiveness Research from the Shop Floor to the Executive Suite," *Journal of Management*, 23:3 (1997), pp. 239–290.
- Dukerich, Janet M., and Anthony P. Ammeter, *Identifying Success Factors for High Performance Project Teams*, Construction Industry Institute, Austin, TX (1998).
- Dutton, Jane E., and Janet M. Dukerich, "Keeping an Eye on the Mirror: Image and Identity in Organizations," *Academy of Management Journal*, 34:3 (1991), pp. 517–555.
- Dutton, Jane E., Janet M. Dukerich, and Celia V. Harquail, "Organizational Images and Member Identification," *Administrative Science Quarterly*, 39:2 (1994), pp. 239–264.
- Hair, Joseph F. Jr., R.E. Anderson, R.L. Tatham, and W.C. Black, *Multivariate Data Analysis*, 5th Ed., Prentice Hall (1998).
- Jackson, Susan E., Joan F. Brett, Valerie I. Sessa, et al., "Some Differences Make a Difference: Individual Dissimilarity and Group Heterogeneity as Correlates of Recruitment, Promotions, and Turnover," *Journal of Applied Psychology*, 76:5 (1991), pp. 675–689.
- Jehn, Karen A., "A Multimethod Examination of the Benefits and Detriments of Intragroup Conflict," *Administrative Science Quarterly*, 40:2 (1995), pp. 256–283.
- Luhtanen, Riia, and Jennifer Crocker, "A Collective Self-esteem Scale: Self-evaluation of One's Social Identity," *Personality and Social Psychology Bulletin*, 18:3 (1992), pp. 302–318.
- Mael, Fred A., and Blake E. Ashforth, "Alumni and Their Alma Mater: A Partial Test of the Reformulated Model of Organizational Identification," *Journal of Organizational Behavior*, 13:2 (1992), pp. 103–123.
- Miles, Matthew B., and A. Michael Huberman, *Qualitative Data Analysis*, Sage Publications (1984).