Job Performance Dimensions for Improving Final Project Outcomes

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Abstract: Job performance is argued to be substantially influential to project performance. However, existing construction management literature pays less attention to job performance issues, not to mention exploring the relationship between job performance and project performance. This study therefore aims at examining the effects of job performance on project performance. Four categories (task, behavior, management, and self) of job performance dimensions were extracted by means of an exploratory factor analysis. A hypothesized model is developed, which specifies the relationships between the four job performance categories (independent variables) and overall project performance (the dependent variable). The model was tested using path analysis. Results indicate that the task category of job performance (consisting of nine dimensions) is significantly related to final project outcomes. Specifically, for the success of a project, a construction company must consider how to ensure employees are equipped with such attributes as responsibility, quality of work, ability, job knowledge, experience, efficiency, accuracy, judgment, and initiative.

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Introduction

Project success is the ultimate goal of every construction project. To determine whether the project is completed as expected, final project performance must be evaluated (Barraza et al. 2004). It is common that there are various degrees of variation between the predicted and the actual project performance. This mismatch is known to be associated with the fact that project performance is influenced by such project characteristics as job performance, project complexity, equipment and materials, techniques, and tools, to name just a few. In order to ensure the achievement of project success, it is crucial to understand the impacts of these characteristics on project performance.

Among other project characteristics, job performance is argued to be substantially influential to project performance. According to Ireland (2004), project costs would reduce by up to 10% and project times by up to 20% if project participants possessed the required professional standards. He further supported the achievement of good project performance through greater commitment to job performance. Katerberg and Blau (1983) stated that, at a more general level, successful job performance is important to both individuals and organizations. As compared to processes and systems, people are active players in achieving project outcomes (Cooke-Davies 2001). Due to the "fragmented" nature of construction projects, job performance evaluation is more vital to project management since employees play a crucial role in such project activities as communication, coordination, problem solving, and project team cooperation (Cheng et al. 2000). This is consistent with Borman and Motowidlo (1997a) who envisaged that more emphasis should be placed on understanding contextual aspects of job performance (e.g., cooperation, interest) due to the synthesis of team-based organizational structure.

Although employee performance is expected to directly affect organizational performance, job performance evaluation, also known as performance appraisal (Woods et al. 1998), is surprisingly not a usual practice of many construction companies. As revealed in a study conducted by Hanna and Brusoe (1997), only 31% of the respondents in the United States admitted that their companies had job performance evaluations and companies with less income or smaller size are less willing to evaluate employee performance.

Since construction projects involve many interdependent work processes, job performance has to be measured on multiple dimensions, such as the quality and quantity of work (Borman 1991; Meyer et al. 1989). It is argued that different dimensions may have different levels of impact on organizations (including project performance) (Conway 1999; Vinchor et al. 1998; Viswesvaran et al. 1996). Revealing their individual effects helps construction companies improve their current human resource practices. For example, Moore et al. (2003) stressed the role played by performance management in selection and development, which can alleviate interest and role conflicts by selecting newcomers with the attribute of conflict avoidance and by developing current staff with the ability to manage conflict resolution.

However, existing construction management literature pays less attention to job performance issues, not to mention exploring the relationship between job performance and project performance. Moore et al. (2003) empirically identified key behavioral competencies for superior construction managers. They focused

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mainly on specific contextual performance attributes maintaining work-related behavior. More recently, Parker and Skitmore (2005) found that turnover has a significant, negative relationship with project team performance as well as project performance. In considering the findings of these studies, the present research goes a step further to examine the effects of various aspects of job performance on project performance. It attempts to understand how performers can facilitate the success of a project. It addresses the research problem by use of empirical research, and the objectives are stated at the end of the literature review.

Following the review of relevant literature, the paper explains sequentially the research methods, the measures used, the analysis, and the results. Finally, there is a discussion section and conclusion.

Literature Review of Job Performance and Project Performance

Job Performance Measures

For the workforce to improve constantly, employee performance must be evaluated and monitored regularly (Hanna and Brusoe 1997). Employee performance can be defined as the achieved work outcomes for each job function during a specified period of time (Deadrick and Gardner 2000). As noted by Shaout and Al-Shammari (1998, p. 323), performance evaluation or appraisal is "a formal, structured system of measuring and evaluating an employee's job related attributes, behaviors, and outcomes to assess an employee's productivity and judge whether he or she will perform as or more effectively in the future, so that the employee, the organization, and society all benefit." Through the years, job performance has been a primary topic of empirical inquiry in applied psychology and management areas.

Of the different ways to measure job performance, researchers have debated about the use of subjective (less quantifiable) and objective (easily quantified) measures (Horowitz and Zappe 1995; Vinchor et al. 1998). Proponents of objective measures have suggested their advantages to reduce both intentional and unintentional biases (e.g., leniency and halo errors) (e.g., Siders et al. 2001). Yet, the most prevalent method is by means of performance ratings, which are subjective evaluations obtained from sources including supervisors, peers, subordinates, self, or even customers, with supervisors being the most commonly used source followed by peers (Bernardin and Beatty 1984; Cascio 1998; Cleveland et al. 1989; Viswesvaran et al. 1996). It is also noted that when studying dimensions of performance, researchers usually measure job performance using subjective supervisory ratings (Meyer et al. 1989; Steers 1977).

On the other hand, job performance measures are known to be criterion measures (Campbell et al. 1993; Cleveland et al. 1989). Researchers of this school have investigated different clusters of performance criteria. For example, Borman and Motowidlo (1997b) classified job performance into task performance (job-specific behaviors, such as core job responsibilities) and contextual performance (nonjob-specific behaviors, such as cooperation, interest). Viswesvaran et al. (1996), in their metaanalysis study of the reliability of job performance ratings, cited the work of Viswesvaran (1993) who empirically identified ten popular component dimensions of job performance and stated that they comprehensively represented the entire job performance domain. They are productivity, quality, leadership, communication competence, administrative competence, effort, interpersonal competence, job knowledge, compliance with or acceptance of authority, and overall job performance. Recently, the study of Hanna and Brusoe (1997) identified 26 criteria for evaluating supervisors' job performance in electrical construction contractors, which include leadership, personal conduct, communication skills, quality of work, ability to deal with problems, delegation of responsibility, work ethic, initiative, accepts responsibility, ability to work with others, and knowledge of work. Dainty et al. (2003), based on their logistic regression analysis, found 12 competencies helping to distinguish between superior and average performers. These competencies are achievement orientation, initiative, information seeking, focus on client's needs, impact and influence, directiveness, teamwork and cooperation, team leadership, analytical thinking, conceptual thinking, self-control, and flexibility.

Empirical studies have also been carried out in extracting different categories of job performance dimensions (e.g., Borman and Motowidlo 1997b). For example, Conway (1999) studied the contextual and task performance distinction to managerial work. Results suggested that while both the interpersonal facilitation and job dedication facets of contextual performance and the technical–administrative task performance would contribute significantly to overall managerial performance, peers and supervisors paid more attention to interpersonal facilitation and task performance, respectively. Lee and Nagaraj (1988) used secondary data of a sample of assembly bench workers in an electronics company to examine eight job performance attributes. They performed factor analysis and extracted two principal components, which are called as positive (job knowledge, speed, quality, attitude and attendance) and negative (initiative, leadership and communication). Igbaria (1991) studied the antecedents and consequences of job performance of management information system (MIS) professionals. The resulting factor analysis of 17 job performance qualities produced two categories of job performance measures. Task category consists of ability, job knowledge, productivity, creativity, quality of work, initiative, judgment, planning, accuracy, and responsibility. Relationship category consists of cooperation, honesty, interpersonal relationship, attitude, dependability, communication skills, and punctuality. Another research group in the United Kingdom, when studying superior managers' behavioral attributes, extracted nine factors of performance effectiveness criteria for construction, which are team building, leadership, decision making, trust, honesty and integrity, communication, understanding and applications, self-motivation, and external relations (Moore et al. 2003; Dainty et al. 2003). Due to their small sample size ($n=20$) and the unfavorable extraction summary of their factor analysis, more rigorous empirical research is worth undertaking.

Project Performance Measures

In the construction industry, project participants are concerned very much about project performance. Project performance evaluation is essential to determine if a project is a success or failure. It appears that time (schedule), cost, and quality are among the most well known measures of project performance (e.g., Brown and Adams 2000; McKim et al. 2000). Moreover, other useful performance measures have been explored. For example, safety measure is suggested (e.g., Oberlander 1993). Constructs of value and effectiveness were also suggested (e.g., Alarcón and Ashley 1996, 1998). Work progress was used in the study of Barraza et al. (2000).

Different theoretical frameworks have been developed to understand the mechanisms underlying project performance issues.

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Dulaimi and Langford (1999) tested the relationship between project managers' (PMs) behavior (five categories) and project performance (time, cost). Their results suggested that certain aspects of a PM's behavior (e.g., organizing and coordinating) are related significantly to project performance. Gransberg et al. (1999) studied the effect of partnering on project performance. They found that the continuous application of partnering results in improved project performance across the entire program. Brown and Adams (2000) investigated the impact of building project management (BPM) on project outputs. Their results indicate that BPM fails to perform as expected for project performance. Odusami et al. (2003) examined the effects of project leadership and team composition on overall construction project performance in Nigeria. Results indicate that significant relationships were found among a project leader's professional qualification, his leadership style, team composition, and overall project performance, but the project leader's profession was not related significantly to overall project performance. Ling (2004), studying factors affecting design–build (DB) project performance, found that contractor characteristics are the key determinants of most project performance metrics. Such contractor characteristics as key personnel management ability, prior work relationship, and staffing level are associated with job performance.

However, research into job performance as an independent variable to explore its relationship with project performance is lacking. The present study represents an original inquiry that contributes to the existing literature by focusing on the following research objectives:

1. Extracting factor components from job performance dimensions to form job performance categories;
2. Examining the effects of job performance categories on overall project performance; and
3. Determining crucial job performance dimensions for improving final project outcomes.

Research Method

A forced-choice methodology was administered. As a multifaceted term, job performance is more often measured by multiple variables. As Viswesvaran et al. (1996) suggested, the broader the meaning of tested variables, the more useful the variables are for general studies, although such variables are more ambiguous. The most important is to make sure the variables are defined properly (e.g., Greenhaus et al. 1990; Touliatos et al. 1984).

An initial step was to consult a group of construction practitioners to identify a set of concrete variables for job and project performance. It is noted that some of these variables had different labels but with similar meaning. By theoretical considerations, a single label was used for similar variables (Campbell et al. 1993). Then, the variables were reviewed and only those which possessed a broad definition and are popular in construction were selected. In other words, variables that were not well received were omitted. For example, contract value was not included because it is a project characteristic rather than a project performance criterion (Dulaimi and Langford 1999). Finally, an inventory of 25 job performance dimensions and four project performance criteria were developed for the present study. The 25 job performance dimensions stemmed from the existing literature (e.g., Touliatos et al. 1984; Greenhaus et al. 1990; Igbaria 1991; Viswesvaran et al. 1996; Brown and Adams 2000; Cheng et al. 2000). For example, ability is defined as the general cognitive task analysis skills (Conway 1999), while quality of work is referred to as the measure of how well the job was done (Viswesvaran et al. 1996). All of the variables were also randomly ordered in the instrument to reduce potential response bias. A five-point rating scale that ranged from 1 (=not important) to 5 (=the most important) was used.

A pilot test was administered to several construction professionals for clarifying and refining the questionnaire. By incorporating their comments, a final questionnaire was created, which consisted of three sections—questions relating to the demographic profile of respondents, job performance instrument, and project performance instrument. A description note for the variables was attached to the final questionnaire, which was then dispatched to a number of construction companies including clients, contractors, consultants, and subcontractors. Altogether there were 137 responses, of which seven were removed due to incomplete data. Using a standard deviation of 3.00 as a criterion (Robitschek and Cook 1999), two univariate outliers were identified and deleted. As a result, 128 responses were used for subsequent analyses.

An analysis of the demographic profile of the respondents reveals that an overwhelming majority (82%) of the respondents were male. The majority of the respondents (57%) were in the age group of "25–34" followed by "35–44" (18.8%), "at least 45" (12.5%), and "less than 25" (11.7%). The job titles of the respondents suggest that the sample consists of mostly nonmanagerial staff (82%). Organizations were mainly contractors (62.5%), followed by clients (16.4%), consultants (10.9%), and subcontractors (10.2%). Out of the 128 responses, 43% were very large organizations ($n > 999$), followed by small organizations (number of employees < 100, 28.1%), medium-sized organizations (100–499, 22.7%), and large organizations (500–999, 6.3%).

Measures

Job Performance

An exploratory factor analysis of the 25 items associated with the job performance dimensions was performed. An *N* factor, principal components factor analysis with a varimax rotation was employed. It produced four factors with eigenvalues greater than one and accounted for 63.47% of the common variance. A scree plot was also performed, which showed that the contributions are relatively low after the fourth component, consistent with the preceding conclusion that four factors provide a reasonable summary of the data. The results achieved the factor loading criteria suggested by the existing literature (e.g., Kim and Mueller 1978; Morse and Wagner 1978). Specifically, item-total correlations for all 25 items exceeded 0.40 ($p < 0.001$) with 5–9 items loaded on individual factors. The scales are of acceptable content validity and internal consistency reliability according to the recommended criteria (e.g., APA 1974; Nunnally 1978). The four extracted factors were labeled as follows:

1. The label "task" contains the following nine items (shown with their factor loadings): job knowledge (0.80), quality of work (0.79), ability (0.73), judgment (0.63), experience (0.61), accuracy (0.60), responsibility (0.59), efficiency (0.53), and initiative (0.45). These items were associated with qualities required to complete a task;
2. The label "behavior" contains six items of honesty (0.75), personal care (0.65), punctuality (0.63), cooperation (0.53), attitude (0.49), and equity (0.47). These items were associated with the essential behavioral attributes at work;

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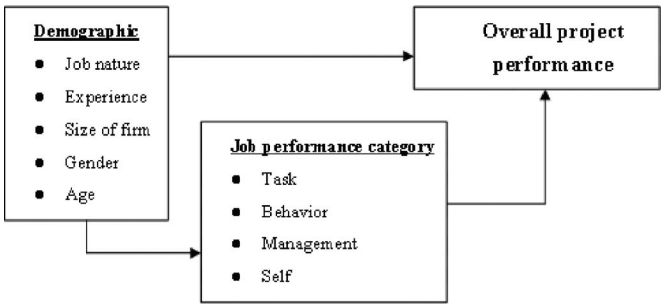

Fig. 1. Hypothesized model

3. The label "management" contains five items of guest relations (0.81), leadership (0.73), communication skills (0.71), interpersonal relations (0.62), and planning (0.57). These items were associated with management skills that one should possess; and
4. The label "self" contains five items of gender (0.78), age (0.77), interest (0.65), creativity (0.63), and dependability (0.52). These items were associated with a person's own nature.

These four categories of job performance were examined separately in all subsequent analyses.

Project Performance

Four criteria of project performance were used, which were cost, time (schedule), quality, and profit. The selection of these criteria followed the postulation that overall project performance should be measured by final project outcomes. Barraza et al. (2004) referred to this as the at-completion project performance. Therefore, construction process criteria, such as safety and rework, were omitted. An exploratory factor analysis was also performed, which produced an unrotated one-factor solution with eigenvalues greater than one and accounted for 63.2% of the common variance. Items with their factor loadings are as follows: cost (0.86), time (0.83), profit (0.75), and quality (0.73).

To ascertain the effect of job performance on project performance, it was necessary to correlate the four job performance categories (independent variables) with the overall project performance (dependent variable). Excluding other biographic variables with nominal scale, the effects of job nature (managerial and nonmanagerial), current job's years of experience (experience), size of firm, gender, and age on job and project performance were also tested. For example, it is postulated that performance attributes may differ somewhat for managers as compared to nonmanagers (Borman and Motowidlo 1993; Conway 1999). This hypothesized model is exhibited in Fig. 1.

Analysis

The hypothesized model was tested by means of path analysis. The present study employed multiple regression analyses to estimate β weights for each independent variable having a direct or indirect path with each dependent variable (Bryman and Cramer 1994). Following Grandey and Cropanzano (1999), two regression equations were created for each set of linked variables: (1) the overall project performance variable was regressed onto demographic variables and the job performance categories; and (2) the job performance categories were regressed onto demographic variables.

Results

Table 1 presents the mean score, standard deviation, and estimates of internal consistency reliability for interval variables. Also shown are two-tailed Spearman rank correlations among all the variables studied. The means indicate that respondents rated the highest on task category of job performance (3.86), followed by categories of management (3.68), behavior (3.53), and self (3.00). The overall project performance measures the mean value of the four project performance criteria, which were perceived by the respondents as very important (4.11).

The scale reliability of the measures was examined by assessing their internal consistency. The alpha coefficients ranged from 0.80 to 0.91, which were found to be acceptable using Nunnally's (1978) criterion being greater than 0.70. The correlation matrix indicates that job performance categories were significantly related among themselves and to project performance in the anticipated direction. In general, the analysis supported the existence of four distinct but correlated components of the job performance instrument. Correlations between demographic variables and

Table 1. Correlations, Means, and Standard Deviations

Variables	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11
(1) Job nature	—	—	—	—	—	—	—	—	—	—	—	—	—
(2) Years of current position (experience)	5.27	4.69	0.26[b]	—	—	—	—	—	—	—	—	—	—
(3) Type of firm	—	—	−0.06	−0.09	—	—	—	—	—	—	—	—	—
(4) Size of firm	—	—	0.15	0.11	−0.47[b]	—	—	—	—	—	—	—	—
(5) Gender	—	—	−0.22[a]	−0.22[a]	−0.14	−0.10	—	—	—	—	—	—	—
(6) Age	—	—	0.33[b]	0.42[b]	−0.04	−0.01	−0.27[b]	—	—	—	—	—	—
(7) Task	3.85	0.69	0.47[b]	0.14	−0.01	0.21[a]	−0.08	0.16	(0.91)	—	—	—	—
(8) Behavior	3.51	0.67	0.33[b]	0.06	0.06	0.05	−0.07	0.15	0.74[b]	(0.83)	—	—	—
(9) Management	3.64	0.84	0.31[b]	0.07	0.11	0.15[a]	−0.15	0.01	0.68[b]	0.68[b]	(0.88)	—	—
(10) Self	3.00	0.76	0.31[b]	0.32[b]	−0.05	0.24[b]	−0.10	0.10	0.56[b]	0.56[b]	0.55[b]	(0.82)	—
(11) Overall project performance	4.11	0.75	0.43[b]	0.06	0.09	0.24[a]	0.01	0.16	0.67[b]	0.53[b]	0.52[b]	0.41[b]	(0.80)

Note: Parentheses in the diagonal cells are coefficient alpha values.

[a] $p < 0.05$.

[b] $p < 0.01$, $n = 128$.

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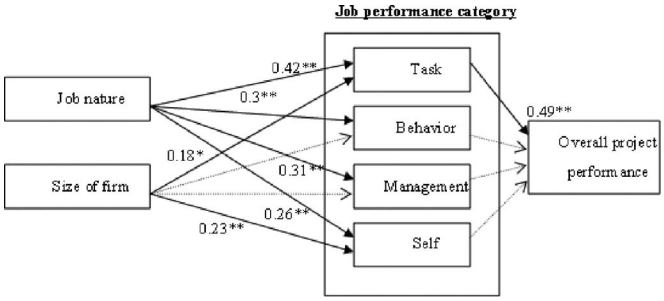

Fig. 2. Path model for variables with significant relationships * denotes $p<0.05$; ** denotes $p<0.01$; dotted arrows represent nonsignificant relationships, while solid arrows represent significant relationships

other variables in the matrix were not significant except for variables of job nature and size of firm.

Fig. 2 contains the results of path analysis of the hypothesized model. Inconsistent with the preceding significant Spearman rank correlations, the magnitude of most of the path coefficients did not strongly reinforce the a priori construction of the model. In effect, only the path from task category of job performance to overall project performance was positive and significant ($\beta=0.49$, $p<0.01$), explaining 24% of the latter's variance. Unexpectedly, the effects of behavior and management categories were positive but not significant, and that of self-category was even slightly negative. Unlike bivariate correlations, multiple regression analysis estimates the weight denoting each independent variable's relative contribution to the overall prediction, and thus the predicted power of other variables becomes weak when an extremely strong predictor is present (Hair et al. 1998).

Among the five posited demographic variables, only the positive path relations between job nature and the four job performance categories were significant: task ($\beta=0.42$, $p<0.01$), behavior ($\beta=0.30$, $p<0.01$), management ($\beta=0.31$, $p<0.01$), and self ($\beta=0.26$, $p<0.01$). Moreover, the size of the firm was positively and significantly related to task ($\beta=0.18$, $p<0.05$) and self ($\beta=0.23$, $p<0.01$) categories. The correlation matrix indicates the significant correlations between two demographic variables (i.e., job nature and size of firm) and overall project performance, while other demographic variables had no significant relationship with overall project performance. However, their correlations are lower than those of the four job performance categories, implying that job performance dimensions were directly related to project performance after taking into account demographic variables.

Discussion

The writers of the present research agree with the view of others (Conway 1999; Motowidlo et al. 1997; Van Scotter and Motowidlo 1996) who stressed the importance of distinguishing the number and content of contextual performance categories from task performance. Thus, the first research objective was to extract potential categories from the 25 job performance dimensions. Initial findings of a four-factor solution are fairly similar to previous surveys. Despite some agreement on a two-category solution (e.g., Borman and Motowidlo 1997b; Greenhaus et al. 1990; Igbaria 1991), more categories have been found in other studies (e.g., Conway 1999; Dainty et al. 2003).

The content of the four categories is somewhat equivalent to prior studies. Some of the extracted task-related dimensions are the same as those in Greenhaus et al. (1990) (i.e., ability, job knowledge, accuracy, and judgment) and Igbaria (1991) (i.e., ability, job knowledge, quality of work, initiative, judgment, accuracy, and responsibility). In essence, similar results in task-related dimensions uphold the validity and reliability of the measures and subsequent analyses based on them, resulting in more valid conclusions that can be drawn from the present study. The following two sections highlight research and practical implications.

Implications for Future Research

The present study represents a point of departure for future research. First, the results suggested that task-related dimensions of job performance are more influential to project performance than other dimensional categories. Further work may help develop instruments for specific dimensions. For example, ability, as one of the task-related dimensions, may be measured using an ability test such as the Wonderlic personnel test (Form A) (Wright et al. 1995). A new investigation may be undertaken to examine the reliability and validity of this scale in the construction environment.

Second, future studies may focus on examining antecedents of individual task-related dimensions. Since the present research validated their significant level to project performance, exploring what factors can strengthen their magnitudes is essential. For example, personality traits and motivational factors may exert influence on job performance. Norris and Niebuhr (1984) studying the effect of locus of control on the relationship between job performance and job satisfaction concluded that responses from internals, who tend to take personal credit for job success, showed a positive relationship between performance and satisfaction. However, Borman and Motowidlo (1997b) suggested that personality traits would correlate more strongly with contextual performance than with task performance. This raises the concern of whether personal attributes are indirect predictors of project performance if taking task performance as the mediator. In contrast, the direct relationship between motivational factors and job performance is worth positing. Katerberg and Blau (1983) found that effort, as a motivational variable, significantly predicts individual performance. Their research was based on specific criteria for evaluating real-estate sales performance. Upcoming research may examine the motivational antecedents of the nine task-related criteria with a construction sample.

The negative effects of role conflict and ambiguity on contextual job performance have been metaanalytically supported (Tubre and Collins 2000). A role is a pattern of work behaviors discerned by an employee (Ilgen and Hollenbeck 1991). Since organizations are systems of roles which guide expected work behaviors (Katz and Kahn 1978), examining the effects of role conflict and ambiguity on individual task-related dimensions may explore the relationship between role and task. Obviously, role conflict is likely to affect work efficiency when an employee spends time to clarify his or her job nature. Also, role conflict is likely to negatively affect his or her motivation at work. Task responsibility will become confused if there is ambiguity in work roles.

Limitations of the paper are threefold. The first limitation is the omission of construction process criteria as project performance criteria. The design of the present study was to examine the effect of job performance dimensions on final project outcomes. These "target-oriented" criteria will be of more interest to

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practitioners. For a more comprehensive study, the "process-oriented" criteria should be considered as they affect work performance in the workplace. The second is the limitation in comparing the present findings with those of other studies. Since other studies might not provide definitions of their tested variables resulting in the possibility of inconsistent meanings of the constructs of interest between this study and other studies, comparing with other studies is contended to be exploratory. The final limitation is the omission of less well-received job performance dimensions. Due to the methodological choice for the present study, tests of popular dimensions are more suitable as they possess more stable psychometric properties and are then more applicable. It is suggested that the study of less well-received dimensions needs special care in selecting appropriate research methods. Sometimes, a qualitative approach is necessary when the research is at the preliminary stage of developing the grounded theory.

Implications for Practical Application

The present survey is unique in that it extracted four categories of dimensions that are relevant to construction job performance. Companies may replicate the research method to identify their own set of key performance criteria for achieving project success. The present research may also be relevant to nonconstruction project management. Other disciplines may use the present findings for developing their job performance framework.

In particular, respondents indicated that the nine task-related dimensions of job performance had the greatest impacts on project performance. These dimensions were responsibility (3.99), quality of work (3.98), ability (3.95), job knowledge (3.95), experience (3.92), efficiency (3.91), accuracy (3.91), judgment (3.65), and initiative (3.39). The findings not only replicate the common premise that the higher the job performance, the greater the project performance, but also provide strong evidence showing that task-related job performance makes greater contributions to project performance (measured by such outcomes as time, cost, quality, and profit). This echoes the view that clear task-performance dimensions clarify job role perceptions and specify the preferred direction of effort toward goal achievement. It is therefore concluded that the nine task-related dimensions are able to form key job performance indicators for optimizing project outcomes. Consistent with Moore et al. (2003), the development of appropriate job performance indicators can help organizations establish the performance appraisal system, job specifications, recruitment and selection policies, incentive scheme, training and development plans, regulations and rules, team management, and even goals and missions. On the other hand, accepting the view that dimensions as leadership and communication competence are difficult to evaluate (Wohlers and London 1989), the strong predicted power of task-related dimensions on project performance aids companies in developing specific evaluation criteria and effective metrics that are easy to quantify.

Since the task category is composed of dimensions measured by both subjective and objective scales, this suggests that job experts need to consider how to combine the two types of scales if they are both used for evaluation. A possible solution is to transform continuous objective scales to discrete ordinal scales. For example, suppose a contractor evaluates their technical workers' performance using his immediate supervisor's rating (a five-point rating scale) and efficiency measure (average weekly overtime work). In order to form a composite score, the overtime work can be transformed to a five-point scale from 1 (= more than 8 h per week) to 5 (= 2 h or less per week). The importance levels of these measures must also be determined. It is common to weight the measures by use of mathematical or statistical methods (e.g., the analytic hierarchy process, the analytic network process, or regression models). Examples can be elicited from Cheng and Li (2001, 2005) and Molenaar and Songer (1998).

Furthermore, the present findings, that respondents with managerial duties rated higher on all job performance dimensions as compared to nonmanagerial staff, may revoke part of the conclusions of Dulaimi and Langford (1999) who had also queried their own findings that the behavior of construction project managers and project performance varied independently. Yet, their findings of the nonsignificant relationships between personal dimensions and project performance have been reiterated in the present research. This reflects what Borman and Motowidlo (1997b) proposed of the stronger correlation between personality traits and contextual performance than task performance. Consistent with Conway (1999), the present study found that managers put more emphasis on task performance. Managers are more self-motivated as compared to other staff at lower grades. For effective performance evaluation, it is suggested to develop separate sets of criteria for nonmanagerial and managerial staff.

Additionally, although the size of the firm seems to affect job performance, it is advised to be cautious in interpreting the results since the size variable scale was ordinal but not interval. Regression analysis is always associated with interval variables, and special care is needed (e.g., support from existing theories) when dealing with dichotomous and ordinal scales (Hair et al. 1998). The findings in general indicate that the larger the size of the firm, the higher the respondents rated task and self-categories but not on behavior and management. It is likely that larger organizations place more emphasis on employees' task achievement and care more for personal needs. Notwithstanding, the positive (though not significant) relationships of the firm's size with behavioral aspects and management skills may imply the necessity to enhance organizational awareness of their relevance to job performance.

Conclusions

The present study sought to contribute to the body of knowledge in several aspects. First, this study employed factor analysis to extract four categories of job performance dimensions. This procedure is essential when there is a need for developing independent categories of job performance, while the variables in each category are intercorrelated. Conceptual models can be examined and built based on an exploratory factor analysis. Second, it is an original investigation of the predicted relationships that represent linkages in a model that can explain the effects of job performance on project performance. An empirical test called path analysis was conducted to examine the hypothesized relationships. Through the present research, it is designed to contribute to the development of empirically grounded theory concerning the mechanisms by which job performance affects project performance. Results suggest the essence of nine task dimensions of job performance for maximizing project performance and the strong predictive power of the two demographic variables (i.e., job nature and size of firm) on the task category. This model is of statistical significance. Research and practical implications are suggested in due course. Certainly, it appears hasty to conclude that task performance dimensions are all that organizations need

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for expediting project performance. Indeed, the relationships between other job performance categories and project performance are worth further scrutiny. The present research is just the starting point, calling other researchers to heed this important but neglected topical issue. Given the lack of attention paid to human resources issues generally in construction practices, this would be a benefit to many practitioners.

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