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# A Taxonomy of Effective Leader Behaviors in the Construction Industry

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# A TAXONOMY OF EFFECTIVE LEADER BEHAVIORS IN THE CONSTRUCTION INDUSTRY

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## ABSTRACT

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The construction industry is a major part of the United States economy, but it is also one of the most dangerous and high-risk industries. The industry is currently facing a shortage of effective leadership, and leaders face unique challenges in coordinating multiple teams of subcontractors on projects. The first step in remedying this shortage is to identify the behaviors of an effective construction leader. To address this need, a taxonomy of effective leader behaviors in construction was developed using grounded theory methodology and rated by construction industry subject matter experts. Archival focus group data from 10 focus groups in three regions of the United States with 66 construction employees including plumbers, pipefitters, safety directors, superintendents, and training instructors were analyzed in the first phase of the study using a grounded theory methodology and subsequently compared to extant construction leadership literature. In the second phase, the validity of the derived taxonomy was assessed in two studies: (1) five doctoral student subject matter experts performed a deductive content analysis and intercoder agreement was found to be acceptable, and (2) 39 construction managers rated the importance and relevance of each of the 36 taxonomy categories along with 3 categories of construction manager behaviors. Overall interrater agreement was acceptable, although low agreement was observed in several taxonomy categories. Mean ratings were compared between taxonomy and construction manager categories using *t* tests and were found to be significantly different. A comparison to extant leader behavior taxonomies demonstrated similarities and differences to the present taxonomy. Evidence from the present study

demonstrates the uniqueness of the construction industry context for studying leadership and can be of use to researchers as an empirically supported framework of effective leader behaviors in construction, and to practitioners for training, selection, and performance evaluation.

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# CHAPTER 1

# INTRODUCTION

The construction industry is a major source of commerce in the United States, averaging $546 billion dollars in output annually and accounting for an average of 3.3% of the entire GDP of the United States (U.S. Bureau of Economic Analysis, 2013). Despite the size of this industry, construction work has been consistently characterized as demanding, strenuous, high-risk, unsafe, and operationally inefficient (Ringen, Seegal, & Englund, 1995; Lingard & Rowlinson, 2005). In 2014, the construction industry suffered more accidents and fatalities than any other industry, totaling 200,900 nonfatal injuries and 908 fatalities (U.S. Bureau of Labor Statistics, 2015a, 2015b). The costs associated with these accidents have been estimated to exceed 11 billion dollars annually (Waehrer, Dong, Miller, Haile, & Men, 2007), placing a significant burden on the quality of life of the workers, their families, their employers, and communities (Everett & Frank, 1996; Waehrer et al., 2007). These burdens can be reduced by improving occupational safety and organizational efficiency through enhanced organizational practices, procedures, and interventions (Schoonover, Bonauto, Silverstein, Adams, & Clark, 2010), yet such improvements have occurred infrequently (Lingard & Rowlinson, 2005).

One avenue for improving the safety and efficiency of the construction industry is via improving the effectiveness of its leaders (Toor & Ofori, 2008). Leadership is a key organizational factor in determining employee performance across industries (Judge & Piccolo, 2004), including construction (e.g., Skipper & Bell, 2006). Leader behaviors can impact employee performance positively or negatively, depending on the style utilized (Howell & Avolio, 1993; Skogstad, Einarsen, Torsheim, Aasland, & Hetland, 2007) and empowering leader behaviors can improve team performance (Srivastava, Bartol, & Locke, 2006). High-quality leader-follower relationships can positively affect employees' work-related outcomes, overall well-being over time (Epitropaki & Martin, 2005; van Dierendonck, Haynes, Borrill, & Stride, 2004), and help employees find meaning in their work (Arnold, Turner, Barling, Kelloway, & McKee, 2007). In addition, leadership can have an effect on employee safety behaviors and outcomes (Christian, Bradley, Wallace, & Burke, 2009; Squires, Tourangeau, Laschinger, & Doran, 2010). Recent meta-analytic research has linked effective leadership to increased safety performance and worker engagement as well as decreased frequency of accidents and injuries (Christian et al., 2009; Clarke, 2013; Nahrgang, Morgeson, & Hofmann, 2011). In contrast, ineffective leadership has been linked to negative safety climate, which potentiates higher injury rates (Barling, Loughlin, & Kelloway, 2002; Kelloway et al., 2006).

The relationships between leadership and employee outcomes are also present in the construction industry (Kaufman et al., 2014; Hoffmeister et al., 2014; Skipper & Bell, 2006). Modeling proper task methods, creating a collective sense of vision, possessing emotional intelligence, and incorporating innovative changes have been linked to team performance in the construction industry (Skipper & Bell, 2006; Sunindijo, Hadikusomo, & Ogunlana, 2007). Ethical leadership, defined as promoting ethical behavior and holding individuals accountable for their ethics, has been associated with extra effort from construction workers as well as greater satisfaction with their leaders (Toor & Ofori, 2009). Further, a leader's construction industry tenure and number of safety inspections performed have been linked to decreased rates of safety-related incidents on project sites (Jaselskis, Anderson, & Russell, 1996).

The preceding evidence demonstrates the criticality of leadership in construction (Toor & Ofori, 2008). Further, the occupational context in construction is unique in terms of the demanding nature of the work (Chan et al., 2003; Chan et al., 2004; Lingard & Francis, 2004;

Swuste, Frijters, & Guldenmund, 2012) and how labor is organized on a project site (i.e., the "quasifirm;" Eccles, 1981). Time pressures, workspace congestion, project duration, and working from heights are only a few of the factors that contribute to the high accident rates observed in the industry (Swuste et al., 2012). Work hours can be long and unpredictable due to a resource shortages and unrealistic project schedules, frequently resulting in weekend work (MacKenzie, 2008).

Compounding the difficulties associated with the work is the quasifirm, which refers to temporary organizational structures on a project site consisting of the subcontractors and general contractors who are present at varying stages of a project (Eccles, 1981). Teams of workers who specialize in trades such as carpentry or masonry join a project site during the appropriate phase of development, complete the work associated with their trade, then move to a different project site to begin again (Lingard & Rowlinson, 2005). Thus, the organizational structure of a project site is temporary in that the teams that are present on the project site depend on the stage of completion of the project and are not consistent from start to finish. The temporary structure of the quasifirm differentiates it from a typical organizational structure where teams and their leaders work consistently on a project from inception to completion. Broader organizational research has demonstrated that organizational change can negatively impact organizational commitment and morale if managed improperly (Gilmore, Shea, & Useem, 1997). The movement of project teams from one project site to another is analogous to organizational change and thus the quasifirm presents unique challenges in both leadership and safety domains that are unique to the construction industry (Lingard & Rowlinson, 2005).

The first-line foremen may be some of the most affected by the unique pressures of the work and the quasifirm, as their role requires them to move from one project site to another with their teams in order to complete specialized trade work (e.g., masonry, carpentry). This is in contrast to the upper managers (i.e., general foremen and construction managers) who consistently remain on project sites to oversee the projects through their life cycles. Foremen have reported feeling overwhelmed by the accountability and responsibility involved in their role yet receive little or no skill development in helping them cope with these challenges (MacKenzie, 2008). Thus, the focus of the present study was on first-line foremen who possess formal authority over at least one worker (Walker & Newcombe, 2000) and are responsible for managing apprentices, journeymen, or subcontractors (Giritli & Oraz, 2004).

Despite the evidence for the importance of leadership in construction, the industry has faced challenges in recruiting and developing effective leaders (Rogers, 2007). Toor and Ofori (2008) noted that there is a dearth of effective leaders in the construction industry, in part due to deficiencies in leadership training programs and low quality leadership interventions. The lack of effective leadership is troublesome given the positive relationship between leadership and construction employee job performance (Bresnen, Bryman, Ford, Beardsworth, & Keil, 1986), including safety performance (Dingsdag, Biggs, & Sheahan, 2008; Kaufman et al., 2014). Systematically classifying effective foreman behaviors using a taxonomic approach (Bailey, 1994; Fleishman, Quaintance, & Broedling, 1984) is a critical step in alleviating the industry's leadership challenges.

Taxonomies have practical utility for job analysis, selection, training, human resource planning, and performance management (Fleishman et al., 1984), and these benefits may be realized in construction. A taxonomy of effective construction leader behaviors (CLBs) could be used to improve the accuracy of job descriptions by providing clear behavioral criteria for effective performance which could in turn alleviate applicants' insecurities about the ambiguity of the role and encourage them to apply (Rogers, 2007). Training and developmental initiatives for foremen can also benefit from the structure that a taxonomy provides as an empirically validated framework for training needs assessment (Surface, 2012). A taxonomy of effective CLBs can also be used to inform performance expectations and set goals for leaders, as well as serve as a comparison point for performance management. Last, construction leadership research has suffered from conflicting recommendations based on individual SME opinions rather than empirical methods (Kirk, 2000) and the CLB taxonomy may contribute to consistency in future construction leadership research by allowing researchers to conduct research from a uniform base. This unification may be a step toward bridging the gap between construction research and applied construction management.

The impetus for a clear identification and classification of effective CLBs is supported by construction leadership researchers, who have called for more research in this area (Rogers, 2007; Toor & Ofori, 2008). This is consistent with the criticism that there has not been enough focus on specific leader behaviors as predictors of important outcomes, such as occupational safety (Zohar, 2002).Considering the financial and human costs associated with injuries in construction (Waehrer et al., 2007) and the importance of leadership for preventing injuries (Clarke, 2013) and increasing job performance (Bresnen et al., 1986; Skipper et al., 2006; Sunindijo et al., 2007), it is evident that there is a need for a systematic examination and organization of effective leader behaviors in the construction industry using a taxonomic approach.

At present there exist a multitude of taxonomies of effective leader behaviors in the broader leadership literature (Fleishman et al., 1991). The contribution of this taxonomy lies in its applicability to the unique and novel context of the construction industry. One of the benefits of context-specific research is its high applicability to the organizations that will use the results, whereas context-free results are of limited utility to organizations (Blair & Hunt, 1986). Evidence for the utility of general leadership theory has been demonstrated in construction (e.g., Kaufman et al., 2014; Hoffmeister et al., 2014; Skipper & Bell, 2006), however, Antonakis, Avolio, and Sivasubramaniam (2003) stated that high-risk situations (i.e., construction) and leader hierarchical level (i.e., first-line foremen) are contextual factors that may alter the observed relationships between leader behaviors and outcomes. This research may also confer benefits to context-free leadership research by identifying new types of leader behaviors which would expand the breadth of leader behaviors to be integrated into existing models (Blair & Hunt, 1986). Given the construction industry's shortage of effective leaders (Rogers, 2007) and the disparate state of the construction leadership literature (Kirk, 2000; Toor & Ofori, 2008), the CLB taxonomy could assist researchers in avoiding the pitfalls of unstandardized operational definitions and guide the development of future construction leadership research and practice.

The present study developed and provided evidence for the validity of a taxonomy of effective construction leader behaviors. The behavioral domain encompasses all foreman behaviors or actions that are deemed effective in the construction industry. The aims of this study were accomplished in two phases using qualitative and quantitative methods. In Phase 1, archival focus group data from 66 construction professionals were analyzed by three subject matter experts (SMEs) using a grounded theory methodology (Glaser & Strauss, 1965; Corbin & Strauss, 2008) to inductively derive taxonomic categories and dimensions of effective CLBs. The findings from the grounded theory analysis were then supplemented by a thorough review of the construction leadership literature to develop an initial taxonomy of effective leader behaviors in construction.

The second phase involved two validation studies assessing the internal and external validity of the taxonomy developed in Phase 1. The first validation study consisted of a deductive coding task involving doctoral student SMEs. The coders sorted 311 CLBs into the 36 categories from Phase 1 and subsequently sorted those 36 categories into 10 dimensions. Intercoder agreement was assessed after completion of the task using Krippendorff's alpha (1971; 2004) and percentage agreement.

The second validation study assessed the external validity of the taxonomy by having 39 experienced construction leaders participate as construction leadership SMEs. The construction leadership SMEs rated each taxonomy category on the bases of importance and relevance for effective first-line foremen. Estimates of interrater agreement (James, Demaree, & Wolf, 1984) were calculated to evaluate the degree of consistency among SMEs' ratings. In order to provide evidence for the external validity of the ratings (Green & Stutzman, 1986), SMEs also provided ratings of relevance and importance to the role of a first-line foreman for three categories of construction manager behaviors (O*NET, 2015a). These construction manager behaviors were considered less relevant to the role of a foreman and mean ratings were compared to ratings for taxonomy categories.

The present study contributes to the existing literature and informs practice in several ways. First, operationally defining, identifying, and organizing effective CLBs will allow researchers to aggregate accumulated knowledge and facilitate continued development of leadership theory (Christian et al., 2009; Fleishman et al., 1984). Taxonomies have strong utility in the identification of clear performance variables, evaluation of past and future research findings, and development of valid measures (Fleishman et al., 1984), all of which would benefit construction researchers and practitioners. Furthermore, such a taxonomy may serve as a means to develop leadership training programs for present and potential future foremen, provide clear criteria for selection or promotion into foremen positions, and evaluate the performance of current foremen (Fleishman et al., 1984). Overall, the CLB taxonomy of effective CLBs is an important step toward improving foremen effectiveness and worker performance on construction project sites, saving both financial and human costs.

# CHAPTER 2

# LITERATURE REVIEW

## The Nature of Leadership in Construction

**Who is a construction leader?** For each construction project, there are six levels in the project hierarchy: (a) the client, (b) site designers, (c) construction managers (e.g., general foremen, project managers, project superintendent; O*NET, 2015a), (d) first-line foremen (e.g., field supervisor, job superintendent; O*NET, 2015b), (e) general contractor employees and subcontractor managers, and (f) subcontractor employees (Radosavljevic & Bennett, 2012). This hierarchy is not universal, as variability exists among job titles and roles depending on the size of the project and the naming conventions for job titles (Goodhue, 2015). Despite its lack of specificity, this hierarchy is representative of the typical leadership structure of a construction project and is a useful framework for defining the roles for each level of employee.

The genesis of a project proceeds through the organizational hierarchy as follows. First, a project initiates when the client selects a general contractor and agrees upon desired outcomes (Radosavljevic & Bennett, 2012). Designers then create the architectural scheme and provide construction managers (CMs) with instructions. CMs in turn communicate building instructions to the general foremen, who pass the information on to first-line foremen, contractors, and subcontractors, who then commence building. During the project, CMs ensure compliance with regulations, document construction actions, and devise solutions to production delays (O*NET, 2015a). CMs also act as a communications hub for all levels of the hierarchy, communicating project status updates to the client and addressing any issues or conflicts reported by employees (O*NET, 2015a; Radosavljevic & Bennett, 2012)

In contrast to the CMs and general foremen who oversee the entire project site, the first-line foremen are responsible for monitoring a subsection of the project and the team that is working on that subsection, serving as a link between management and workers (Borcherding, 1977). First-line foremen's primary tasks include management of personnel and material resources. In managing personnel, the first-line foremen delegate tasks to workers; motivate and encourage workers while fostering positive relationships; resolve conflict; monitor performance for speed, quality, and safety; coordinate tasks with other contractors; and provide project status updates to the CM. In managing material resources, the first-line foremen interpret the CM's building instructions, inspect tools for quality and safety, order supplies and materials, and improve processes on the project site. Similar to the first-line foremen, subcontractor managers perform the same tasks, but on the subset of the project that they have been contracted for (O*NET, 2015b).

In this study, a "construction leader" was defined as a first-line foreman who possesses formal authority over another employee and is involved in monitoring and directing construction work. The first-line foreman was selected on the bases that they serve as a crucial communications point between workers and upper management (i.e., general foremen and project managers) and that the first-line foremen level in the organizational hierarchy is most likely to be affected by the fluctuations inherent in the quasifirm. The frequent movement of first-line foremen and their teams from one project site to another makes them the most mobile of the leadership positions, more so than general foremen and project managers who remain as leaders on a project site through its completion (Radosavljevic & Bennett, 2012). Organizational culture and climate theory suggests that direct supervisors have greater influence on worker attitudes, motivation, and performance (Ostroff, Kinicki, & Muhammad, 2013). Support for this theory has been found in the occupational safety literature where organizational safety climate is fully mediated by group-level safety climate (Zohar & Luria, 2005) and the behaviors of direct supervisors have been linked to increases in workers' safety performance (Luria, Zohar, & Erev, 2008; Zohar & Polachek, 2014). The combination of foremen's status as upper management liaison and their direct influence over the workers make foremen a key target for improving construction industry outcomes.

**Construction as a unique industry.** Within a single construction project, there can be as many as 35 divisions of tasks ranging from masonry to waste control, all of which are performed by either the general contractor or subcontractors (Construction Specifications Institute, 2012). Throughout the construction process, there exists a complex interplay of separate organizations, people, tools, equipment, and materials coordinated by communications that the leadership must navigate (Radosavljevic & Bennett, 2012). Eccles (1981) called these temporary organizations "quasifirms." In a quasifirm, the organization of work and leadership is constantly fluctuating over time as several parent organizations including the client, the main contractor, and subcontractors create the working staff of a project site, only some of whom are involved from start to finish. This quasifirm presents a stark contrast to most other industries, which have stable organizational structures over time (Eccles, 1981). The level of complexity regarding the coordination of over 35 divisions of labor and the temporary nature of partnerships for every project makes construction a unique industry, which presents unique challenges to its leaders (Chan et al., 2003).

One of the challenges presented by the quasifirm is the temporary nature of partnerships between general contractors and subcontractors (Giritli & Oraz, 2004; Lingard & Rowlinson, 2005). CMs often have tense working relationships with subcontractors, including difficulties with trust, low quality communications, and poor cooperation, which in turn lead to delays and cost overruns (Chan et al., 2003; Chan et al., 2004; Laan, Noorderhaven, Voordijk, & Dewulf, 2011). Chan et al. (2004) have suggested the adversarial relationships that characterize the industry could be remedied by encouraging partnership, and Laan et al. (2011) explain that trust in construction industry partnerships can only emerge after organizations commit to improving these partnerships through personnel selection, informal communication, and the encouragement of an open and transparent climate. The tension in these partnerships is often exacerbated by their temporary nature, which handicaps the development of trust and support (Eccles, 1981).

Adding to the challenges introduced by tense partnerships between contractors is the impact of organizational change on employee outcomes. First-line foremen consistently manage the same crew, however moving to different project sites requires adjustment to the project sites' organizational climates which are subject to the interpretation of policies and practices by general foremen and project managers (Beardsworth, Keil, Bresnen, & Bryman, 1988). Lewin's (1947) organizational change theory states that when organizations change, they proceed through three stages: unfreezing, moving, and refreezing. It can be reasonably argued that construction projects move through Lewin's model every time the completion of a phase results in the departure of a subcontractor team and the arrival of a new subcontractor team. Broader organizational change research has found that these processes can be accompanied by increased productivity, but also decreases in organizational commitment and morale (Gilmore et al., 1997). If these changes are not properly managed by leadership, the deleterious effects of organizational change may present themselves more readily than the positive effects (Gilmore et al., 1997). As such, proper management of quasifirm changes may be essential for construction leaders to maximize positive effects and minimize negative effects.

In addition to the flux related to the quasifirm, the nature of the work itself is also demanding and high-risk (Lingard & Francis, 2004; MacKenzie, 2008). Physical and organizational uncertainty are constantly present; tight deadlines lead to long work hours and weekend work; and cost overruns lead to excessive pressures placed on the project teams (Lingard & Francis, 2004). These pressures may negatively impact non-work aspects of workers' lives which could in turn lead to decreased safety performance (Gelinas, 2013).

While overwork and uncertainty also occur in other industries, the simultaneous confluence of these factors and the environment in which they occur make construction unique. Construction workers are exposed to hazardous weather conditions, high voltage power lines, and hazardous chemicals which could interact with pressures inherent in the work and negatively impact safety, well-being, and performance. This set of demands is unique to the workers and may explain why Lingard and Francis (2004) found that project site workers experienced significantly greater burnout and work-family conflict than construction employees who worked in offices. Considering leadership may be a resource in alleviating these pressures (Jaselskis et al., 1996), the nature of effective leadership in this unique context should be examined.

**Shortage of effective leadership.** Despite the demonstrated importance of construction leadership and its impact on employee performance and health (Slates, 2008), the construction industry is currently experiencing a shortage of effective leaders, which may be partly responsible for the high rates of negative safety outcomes (Chartered Institute of Building [CIB], 2008). The CIB (2008) surveyed 655 construction employees from different organizations around the world, consisting primarily of directors, senior, middle, and junior management, skilled professionals, and a small portion of academics, students, consultants, and contractors. Of the 655 respondents, 56% said their organizations did not have a leadership strategy in place.

This shortage of leaders may be due to the reluctance of experienced workers, known as journeymen, to seek promotion into foreman roles (Rogers, 2007). Reasons presented for this reluctance are the hassles of supervisory work, aversion toward interpersonal conflicts, concerns about work-family balance, and a lack of supervisory skills (Rogers, 2007). Additionally, an increase in university enrollment (Dainty, Ison, & Briscoe, 2004), combined with a poor public image of the industry as being unintellectual have led to challenges in recruiting young workers, resulting in smaller selection pools and a shortage of skilled workers (Dainty et al., 2004; Rameezdeen, 2007).

In a dangerous industry marred by injuries and fatalities (BLS, 2013, 2014), the shortage of effective leadership poses a major problem that must be addressed (Dainty et al., 2004; Rogers, 2007). The CIB (2008) states that investing in the development of construction leadership is essential to the continued physical and financial health of organizations and their employees. Journeymen may be encouraged to step into leadership roles if their responsibilities and expectations are better defined and they are better prepared to handle the demands of leadership roles (Rogers, 2007). A taxonomy of effective CLBs would provide clear expectations for the role of a foreman and demonstrate the intellectual challenges of the role as a means of improving the public image of the industry. By utilizing this taxonomy, organizations can improve marketing for construction leadership positions with clear definitions of job responsibilities. In addition to marketing and recruitment benefits, a clear definition of the construction leader role would help organizations address journeymen's concerns about the hassles of supervisory work by presenting them with clear behavioral instructions to utilize in their leadership roles (Rogers, 2007).

## The Effectiveness of Leadership

**The effect of leadership on follower outcomes.** The full-range leadership model (FRLM; Bass, 1985) has been utilized extensively for studying the relationship between leader behaviors and follower outcomes (Antonakis et al., 2003). The FRLM proposes three broad types of leader behaviors: transactional leadership, transformational leadership, and laissez-faire leadership (Bass, 1985, 1999). *Transactional leadership* is an economic exchange style of leadership which emphasizes mutual self-interest between leaders and followers, and consists of three dimensions: contingent reward, management by exception-active, and management by exception-passive (Bass, 1999). *Transformational leadership* involves motivating followers to achieve beyond expectations and transcend self-interest by arousing higher order needs than those of economic reward, and includes five dimensions: idealized influence (attributed), idealized influence (behavior), inspirational motivation, intellectual stimulation, and individualized consideration (Antonakis et al., 2003; Bass, 1985, 1999). Finally, *laissez-faire leadership* is the absence of leadership, and avoidance of action and decision-making (Bass, 1999). Bass (1999) argues that transformational leadership and transactional leadership are not mutually exclusive, but can be combined to enhance the effects of leadership through a process termed *augmentation*.

A meta-analysis by Judge and Piccolo (2004) revealed positive effects of transformational leadership and aspects of transactional leadership (i.e., contingent rewards and management-by-exception active) on followers' job satisfaction, satisfaction with leader, motivation, group/organization performance, and rated leader effectiveness. Conversely, management by exception-passive (a dimension of transactional leadership) and laissez-faire leadership were negatively related to followers' job satisfaction, satisfaction with their leader, motivation, group/organizational performance, and rated leader effectiveness (Judge & Piccolo, 2004).

Further, Avolio, Reichard, Hannah, Walumbwa, and Chan (2009) found significant effects of leadership interventions on improvements in employee affective (e.g., job satisfaction), behavioral (e.g., task performance), cognitive (e.g., perceived equity), and organizational outcomes (e.g., group accuracy). The overall effect for leadership interventions was a corrected *d* of .65, suggesting a moderate to large effect size for improving employee outcomes (Cohen, 1988), and the 95% confidence interval ranged from .26 to 1.08 for all interventions. The effects of interventions were greatest for organizational outcomes ($d$ = .97), then behavioral ($d$ = .67); cognitive outcomes ($d$ = .65) revealed similar effects, and affective outcomes were impacted the least ($d$ = .50). It is clear that leadership has an impact on employee and organizational outcomes, but how do these relationships manifest in the construction industry?

**Leadership and employee effectiveness in construction.** The role of leadership in construction projects is crucial, as they are charged with managing people, tools, equipment, materials, meeting deadlines, and maintaining cost efficiency (Radosavljevic & Bennett, 2012). Leaders must communicate clear objectives, create shared project goals across teams, weigh risk versus safety, make authoritative decisions, communicate those decisions effectively, and balance the needs of the client with those of the project (Walker & Vines, 2000).

Despite evidence for the importance of leaders in construction, the relationship between leadership and concrete measures of employee outcomes in the construction industry has not been adequately researched (Toor & Ofori, 2008). The majority of available information is founded in opinions rather than empirical studies (Kirk, 2002; Green, 2011), and outcomes examined are most often in the form of ratings of effectiveness rather than objective criteria such as employee well-being, performance, and project profitability (Toor & Ofori, 2008).

***Leadership and subjective employee outcomes.*** Three studies have examined the relationship between leadership and subjective employee outcomes in construction populations (Chan, 2005; Limsila & Ogunlana, 2008). Two studies found positive relationships between transformational and transactional leadership with extra effort from employees, perceived leader effectiveness, and employee satisfaction with their leader (Chan, 2005; Limsila & Ogunlana, 2008). Laissez-faire leadership was negatively related to these outcomes (Chan, 2005; Limsila & Ogunlana, 2008). Last, ethical leadership, defined as demonstrating high moral standards and ethical behavior, was positively linked to ratings of leader effectiveness, follower satisfaction with their leader, and extra effort from employees (Toor & Ofori, 2009).

***Leadership and group performance.*** Skipper and Bell (2006) examined the relationship between construction leadership and objective employee outcomes, testing for differences in leader behaviors between 40 CMs of top performing teams and a comparison group of 40 CMs randomly selected from the rest of the organization. The CMs in the top performing group were selected by executives who identified them as top performers in the areas of quality, safety, cost, communications, and client relations. Skipper and Bell found significant differences in the frequency of effective leader behaviors between the CMs in the top groups and the comparison groups. Top CMs were better at leading by example, acting in accordance with organizational values, inspiring toward a common cause, and improving processes through risk taking and innovation. These behaviors are consistent with the inspirational motivation and intellectual stimulation factors within transformational leadership (Bass, 1999), demonstrating evidence that a transformational leadership style may be effective in construction. The generalizability of effective CM behaviors to the position of a first-line foreman remains to be examined, however foremen have been previously studied as a population (Toor & Ofori, 2008).

Hinze and Kuechenmeister (1981) found that foremen of top performing groups were more experienced, had previous experience working with their employees, were casual yet firm when communicating with their employees, and exhibited pride toward the group's performance. Other research findings with construction populations show leaders can positively impact innovation of processes by sharing their knowledge and competencies (Bossink, 2004) and improve project performance by promoting innovation (Dulaimi, Nepal, & Park, 2005).

Conversely, other studies have reported differential effects of leadership on project performance. Dulaimi and Langford (1999) found no relationship between CM behaviors and project time or project cost in a study of 62 CMs. Naoum, Fong, and Walker (2004) found that the mere utilization of CMs improves cost and quality, but not project time, and Adams (2007), found superintendent competency was positively linked to job performance, which was then related to project profitability.

***Situational factors as a moderator.*** The challenges inherent in construction leadership are exacerbated by variability in the effectiveness of leader behaviors depending on the situation (Giritli & Oraz, 2004). Bresnen et al. (1986) argued that the relationship between construction leadership and employee effectiveness is moderated by situational factors, and utilized Fiedler's Contingency Model (1972) to test this hypothesis with a sample of 43 site managers. Fiedler's Contingency Model states that the effectiveness of a leader depends on situational favorability, which has three components: (a) the leaders' official position of power, (b) the complexity of the task, and (c) the quality of the relationship between the leader and his employees. Favorable outcomes occur when leaders hold high positions of power, employees are performing simple tasks, and the relationship between the leader and employees is of high quality. Bresnen et al. found that situational factors moderating the effectiveness of leadership are the length of a project, the extent to which sub-contracted labor is being used, and the total estimated cost of the project.

This moderation hypothesis was supported in a later study, which found the relationship between a leader's style and performance is moderated by the length of the project (Bryman, Bresnen, Ford, Beardsworth, Keil, 1987). Bryman et al. (1987) found that leader style is positively related to project performance overall, but that this relationship was nonexistent in short projects and stronger in long projects. Similarly, Rowlinson, Ho, and Po-Hung (1993) found that leaders behave differently throughout the project, as supportive styles are often used in pre-contract stages and directive styles are used once contracts are signed. Additionally, Conchie (2013) discovered that role overload (e.g., conflicting responsibilities), production demands (e.g., prioritization of time over safety), and workforce characteristics (e.g. language barriers) hindered leaders' involvement in safety leadership.

The effect of leader behaviors on employee outcomes has been examined but is still understudied and lacking objective measurement of outcomes (Toor & Ofori, 2008). One reason for conflicting findings may be the variability in leadership theories utilized for studies, as some use Fiedler's Contingency Model (1972; Bresnen et al., 1986; Bryman et al., 1987) and others use the FRLM (Chan, 2005; Limsila & Ogunlana, 2008). This lack of parsimony could be remedied by conducting all leadership research in the construction industry from a common starting point (i.e., a taxonomy), and emphasizing the use of outcomes that are both objective (e.g., quantified job performance) and subjective (e.g., ratings of effectiveness).

**Leadership and Employee Safety and Health in Construction**

**Leadership and safety across industries.** Across industries, leadership has been identified as a key factor for predicting workplace safety performance and outcomes (Christian et al., 2009; Clarke, 2013; Nahrgang et al., 2011). Nahrgang et al. (2011) meta-analyzed 179 studies from construction, health care, manufacturing, and transportation industries, and defined leadership as a leader's style, the relationship between leaders and subordinates, trust, and supervisor support for safety. Leadership was found to be negatively related to accidents and injuries ($r_c = -.14$), unsafe behavior ($r_c = -.32$), and adverse events, defined as near misses, safety events, and errors ($r_c = -.22$). Leadership was also found to be positively related to safety compliance ($r_c = .62$). Christian et al. (2009) meta-analyzed 90 studies and found leadership, defined as generally effective leader behaviors, to be negatively related to accidents and injuries ($r_c = -.16$) and positively related to safety performance ($r_c = .31$). Additional leadership indices measured were supervisor support, defined as the utilization of safety-related behaviors, and management commitment, defined as subordinate perceptions of management's commitment to safety (Christian et al., 2009). Both supervisor support and management commitment were negatively related to accidents and injuries ($r_c = -.24$; $r_c = -.36$) and positively related to safety performance ($r_c = .38$; $r_c = .40$; Christian et al., 2009). Last, Clarke (2013) meta-analyzed 103 studies using the FRLM as a framework and found significant effects of leadership on safety compliance and safety participation. Transformational leadership had a path coefficient with an overall effect on safety participation of .38, and transactional leadership had an overall effect on safety compliance of .38, and an indirect effect on safety participation of .11 (Clarke, 2013).

**Leadership and safety in the construction industry.** The relationship between leadership and occupational safety has also been found in the construction industry (Hoffmeister et al., 2014; Jaselskis et al., 1996; Slates, 2008). Specifically, Jaselskis et al. (1996) revealed that organizations whose leaders discussed safety performance with site supervisors reported significantly fewer incidents to the Occupational Safety and Health Administration than those that did not. Other leadership variables that have been positively associated with construction safety included the leaders' commitment to safety, leader's personal accountability, safety modeling behaviors, and clear communications about employees' safety roles and responsibilities (Biggs, Banks, Davey, & Freeman, 2013; Findley, Smith, Kress, Petty, & Enoch, 2004; Slates, 2008; Sunindijo et al., 2007). Conversely, poor time management, lack of delegation, impatience, poor communication skills, and indecisiveness by leaders have been linked to negative safety outcomes (CIOB, 2008). Hoffmeister et al. (2014) also examined the relationship between transformational and transactional leadership styles with safety climate, safety behaviors, injuries, and pain. Idealized attributes (i.e., charismatic leadership characteristics) were found to have significant positive relationships with safety compliance, and safety participation. Idealized behaviors and active management by exception were both negatively related to injury and pain, respectively, in a sample of apprentices (Hoffmeister et al., 2014).

Construction leadership can also impact safety climate (Hoffmeister et al., 2014; Mohamed, 2002), which in turn impacts the number of accidents (Christian et al., 2009). Huang, Ho, Smith, and Chen (2006) found that management commitment to safety affected self-reported injuries via safety climate and perceived control over safety in a sample of 2680 employees in manufacturing, construction, service, and transportation industries. Similarly, Kaufman et al. (2014) demonstrated that the relationship between workers' perceptions of leader justice and workers' safety performance was moderated by supervisor's support for safety such that the effect of leader justice on safety performance increased when supervisor support was high. These findings indicate that while the construction industry is unique for the study of first-line leadership, it is comparable to other industries in terms of the behaviors that are most effective for safety outcomes.

**Leadership and health across industries.** Several studies have examined the relationship between leadership and occupational health outcomes. In addition to considering safety outcomes, Nahrgang et al. (2011) examined the relationship between leadership and burnout, defined as poor health, anxiety, and depression, and found a corrected correlation of -.36. Similarly, a meta-analysis of 27 studies by Kuoppala, Lamminpaa, Liira, and Vainio (2008) found leadership to be moderately predictive of job-related stress, exhaustion, anxiety, depression, sick leave, and early retirement. Last, Zwingmann et al. (2014) performed a cross-sectional study of 93,576 employees across 16 countries and found significant effects of transformational leadership and contingent reward transactional leadership on employee well-being ($\beta = .42$; $\beta = .09$) and physical health ($\beta = .15$; $\beta = .12$) in a multilevel model. The combination of meta-analytic research with the representative sample found in the Zwingmann et al. study provides ample support for the impact leaders can have on their subordinates' physical and mental well-being.

**Leadership and health in the construction industry.** There is little research regarding the effects of leadership on occupational health outcomes in the construction industry. Siu, Phillips, Leung (2004) examined the relationship between communications with management and psychological strains, defined as anxiety, depression, and decrease in pace of work. Using a sample of 374 construction workers, Siu et al. found a correlation of -.19 between management communications and psychological strains. In another study, Melia and Becerril (2007) sampled

105 construction workers and found adequate fit for a mediational model where leader support positively impacted psychological health, mediated by a reduction in tension and burnout. Additionally, McCabe, Laughlin, Munteanu, Tucker, and Lam (2008) found subordinate ratings of leadership quality negatively correlated with self-reported psychological symptoms (e.g. difficulty sleeping, loss of confidence) across 84 different construction project sites. Most recently, Leung, Chan, and Yuen (2010) tested the relationship of perceptions of unfair treatment and reward with emotional exhaustion and frustration. One hundred and forty-two construction workers were sampled and results showed that unfair treatment predicted emotional exhaustion and frustration ($\beta = .22$; Leung et al., 2010).

The reviewed leadership research presents a strong statement about the value of effective leadership in improving the occupational safety and health of employees on construction project sites. Given the multitude of demands placed on construction leaders (Bresnen et al., 1986) and the impact of the quality of their leadership on safety performance and organizational outcomes (Jaselskis et al., 1996), the need to systematically identify and classify effective leader behaviors in construction becomes even more evident.

**Leadership Taxonomies**

Taxonomies are used to specify the key components of phenomena, simplify complex concepts, identify similarities and differences, present an exhaustive list of dimensions, and provide a framework for hypothesis generation (Bailey, 1994). Taxonomies allow researchers to (a) bridge the gap between research and practice by consolidating redundant constructs, (b) introduce parsimony between experimental and applied designs, and (c) alert behavioral scientists to possible sources of variance that may contaminate or negate research findings in an operational setting (Fleishman et al., 1984). In developing theory, the utility of taxonomies lies in the provision of consistent terminology when searching literature, as well as establishing a uniform base for conducting and reporting research, thereby allowing for more valid comparisons across studies.

**Taxonomies of leader behaviors.** There have been numerous attempts to categorize leader behaviors (e.g., Prien, 1963; Mintzberg, 1973; Komaki, Zlotnick, & Jensen, 1986), but the two most influential were leadership taxonomies by Fleishman et al. (1991) and Yukl, Gordon, and Taber (2002; Yukl, 2012). Fleishman et al.'s taxonomy was derived from a comparison of 65 different taxonomies of leadership spanning 42 years of leadership research. They arrived at four dimensions of leader behaviors, each consisting of three to four categories: (a) information search and structuring, (b) information use in problem solving, (c) managing personnel resources, and (d) managing material resources. The first dimension, *information search and structuring*, includes the acquisition of information, evaluation of acquired information, and ensuring subordinates' understanding of communicated information. The next dimension, *information use in problem solving,* involves identifying and creating solutions for problems and communicating instructions to subordinates. The third dimension, *managing personnel resources*, includes the assessment of subordinate qualifications, assigning subordinates to positions, motivating and developing subordinates, and monitoring performance. The final dimension, *managing material resources,* involves allocating materials such as tools or funds, facilitating repair of equipment, and monitoring levels of supplies.

Fleishman et al.'s (1991) taxonomy emphasizes management of information, personnel, and material. Fleishman et al.'s theory of leadership relied on the functional leadership perspective, which states that the role of the leader is to define and help subordinates achieve goals. As such, there is little consideration of differences in leadership styles. Acknowledgement of Bass's (1985) full-range leadership model is present in the manuscript, yet largely absent in the taxonomy, with the exception of the "motivating personnel" category, which includes elements of motivation, support, and serving as a role model. Fleishman et al. briefly discuss transformational leadership, and loosely link it to "identifying needs and requirements," "planning and coordinating," and "developing and motivating personnel," but these categories do not fully capture aspects of transformational leadership, such as individualized consideration (Bass, 1985). Fleishman et al.'s taxonomy focuses primarily on outcomes, and transformational leadership places more emphasis on how a leader arrives at outcomes rather than whether outcomes were achieved. One key example in support of this claim is that contingent reward and inspirational motivation can both be motivational, yet have been found to have differential and augmented relationships with outcomes (Judge & Piccolo, 2004). Such a differentiation is not present in the Fleishman et al. taxonomy, potentially due to its foundation in 65 pre-existing taxonomies published before 1990. The emphasis on functional leadership is largely reflective of the state of the research at the time, which had yet to incorporate Bass's full-range leadership model.

The taxonomy created by Yukl et al. (2002) was derived from a qualitative review of the leadership literature, a study of 318 subordinate ratings of their manager's behaviors (Yukl, 1998), and an exploratory factor analysis that found support for a three factor model of leader behaviors. The three-factor taxonomy was then validated using confirmatory factor analyses with two samples of 174 consulting managers and 101 students enrolled in Master of Business Administration graduate programs (Yukl, 2002). A fourth factor was added by Yukl (2012) as a qualitative addition.

The four dimensions in Yukl et al.'s (2002; Yukl, 2012) taxonomy are: (a) task-oriented, (b) relations-oriented, (c) change-oriented, and (d) external leader behaviors. *Task-oriented* behaviors include clarifying, planning, solving problems for, and monitoring the performance of subordinates. *Relations-oriented* behaviors involve development, empowerment, recognition, and support of subordinates. *Change-oriented* behaviors consist of organizational innovation, advocating for and envisioning change, facilitating collective learning, and risk-taking. *External* behaviors include networking with industry partners, monitoring the external business environment, and representing the organization in a favorable light.

**Comparison of two extant taxonomies of leader behaviors.** Both taxonomies of leader behaviors are presented for side-by-side comparison in Table 1.

Table 1

*Two Popular Taxonomies of Effective Leader Behaviors*

| Authors | Dimensions | Categories |
|---|---|---|
| Fleishman et al., 1991 | | |
| | Information search and structuring | Acquiring, organizing, and evaluating information, feedback and control |
| | Information use in problem solving | Identifying needs and requirements, planning and coordinating, communicating information |
| | Managing personnel resources | Obtaining and allocating, developing, motivating, utilizing and monitoring personnel resources |
| | Managing material resources | Obtaining and allocating, maintaining, utilizing, and monitoring material resources |
| Yukl, Gordon, & Taber, 2002; Yukl, 2012 | | |
| | Task-oriented | Clarifying, planning, monitoring operations, problem solving |
| | Relations-oriented | Supporting, developing, recognizing, empowering |
| | Change-oriented | Advocating and envisioning change, encouraging innovation, facilitating collective learning |
| | External | Networking, external monitoring, representing |

Both of these taxonomies have been influential, but they differ in their conceptualizations of leadership. Some categories can be readily compared, such as *task-oriented* and *relations-oriented* categories from Yukl, which can be matched with *managing material and personnel resources* from Fleishman, respectively. However, change-oriented and external categories are notably absent from Fleishman's taxonomy. The absence of change-oriented and externally-oriented behaviors is likely due to their respective publication years and the changes in leadership theory that occurred during that time (i.e. the emergence of Bass's full-range leadership model). Yukl's *change-oriented* and *external* categories of behaviors contain inspirational and networking components of leadership, whereas Fleishman's taxonomy more accurately describes behaviors of effective managers. The *task-oriented* and *relations-oriented* categories from Yukl contain effective management behaviors and thus the Fleishman taxonomy can be subsumed under the broader Yukl taxonomy.

***Utility of taxonomies and development guidelines.*** The taxonomies developed by Fleishman et al. (1991) and Yukl et al. (2002) have been extensively used in leadership research, having been cited approximately 885 times collectively. Both Fleishman et al. and Yukl et al.'s taxonomies were used to evaluate the effectiveness of leadership training (Ely et al., 2010). Yukl et al. (2002) has been used for meta-analytic coding (Cummings et al., 2010) and for assessing the effects of change-oriented behaviors on group performance outcomes (Gil, Rico, Alcover, & Barrasa, 2005). Fleishman et al. has been cited often in team research, and was used as a framework for a meta-analysis of effective leader behaviors in teams (Burke et al., 2006).

While these leader taxonomies have been successful, Fleishman et al. (1991) warned that previous taxonomies have suffered from a lack of cohesion in defining effective leadership and conflation of behaviors with traits, knowledge, skills, and abilities. Fleishman et al. stated that taxonomies with unstandardized operational definitions that do not clearly limit the behavioral domain such that it excludes non-behaviors (e.g., traits, knowledge, skills, and abilities) result in abstract taxonomies with limited practical use because leadership training that utilizes abstract content is less effective.

In heeding these warnings, the present study abided by Fleishman and Quaintance's (1984) four requirements for developing a taxonomy: (1) a clear definition of the behavioral domain, (2) the presence of causal hypotheses regarding the leader behaviors, (3) the evaluation of the classification scheme through tests of construct validity, and (4) clear rules for categorizing similar behaviors. The present study had a clearly identified behavioral domain, which was first-line foreman leader behaviors. The causal hypothesis was that engagement in the behaviors identified would result in outcomes associated with effective leadership in the construction industry. Addressing the third requirement, construct validity was assessed using two studies to determine both the internal validity of the qualitative analysis and the external validity of the first-order categories. Last, the rule for categorization of new behaviors is determined by its fit with the operational definitions of categories. By following these guidelines, the final product was a taxonomy of clear, measurable, and observable behaviors that represent effective leadership in the construction industry.

The procedures used in developing this taxonomy replicated existing leadership research (Fleishman et al., 1991; Yukl et al., 2002; 2012) and resulted in a taxonomy that aimed to contribute to both general leadership and construction leadership theory and practice in several ways. The use of grounded theory methods replicated past research on effective leader behaviors by grounding analyses in real-world qualitative data. By reconstructing categories based on qualitative data and then comparing the taxonomy to existing leader behavior taxonomies, a duplication of the structure of existing leadership taxonomies may occur, thus providing evidence for validity via independent replication of results (Roediger, 2012). The grounded theory method helps avoid biases in data analysis based on the status of the literature by utilizing data that are independent of literature, whereas basing analyses on existing leadership theory could result in undue influence that blinds the analysts to the unique contributions from the specific context being studied (i.e., construction). Further, if categories that do not neatly fit into the existing taxonomies of leader behaviors were to emerge, that could serve as an indicator that existing taxonomies have too few categories and need to be revised in order to better specify the nuances of leader behaviors in construction.

The largest potential contribution that this taxonomy can make to construction industry research and practice is in identifying the behavioral indicators for each category that specify precise examples of how a category of CLBs could be manifested through behaviors. Given that the Fleishman et al. (1991) and Yukl et al. (2002; 2012) taxonomies focused on context-free generally effective leader behaviors, it is likely that the CLB taxonomy will be contained within the categories specified by Fleishman and Yukl. However, context-free theories are limited in their utility when applying them to context-specific cases (Antonakis et al., 2003). While the highest levels of the taxonomy may end up synonymous with existing categories of effective leader behaviors, the behavioral indicators may not be specific enough to be of use in construction research and practice. Providing specific CLBs would demonstrate to construction researchers and practitioners what effective leadership in construction looks like at the foreman level and how it differs from generally effective leadership. The specificity that this taxonomy provides via its description of specific behaviors translates general leadership theory to construction research and practice. Further, construction research suffers from disparate utilization of leadership theories (Toor & Ofori, 2008) leading to inconsistent results. The inconsistency of these findings could be remedied by providing a uniform starting point for conducting construction leadership research in the future. Overall, the CLB taxonomy contributes to both general leadership theory development via replication and construction leadership research and practice by providing context-specific examples of effective leadership in the industry and a uniform base for conducting future research.

**The Present Study**

The purpose of the present study was to develop and validate a taxonomy of leader behaviors that are effective for promoting employee performance and other positive outcomes in construction organizations (e.g., employee safety). The above goals were accomplished in two phases as presented in Figure 1.

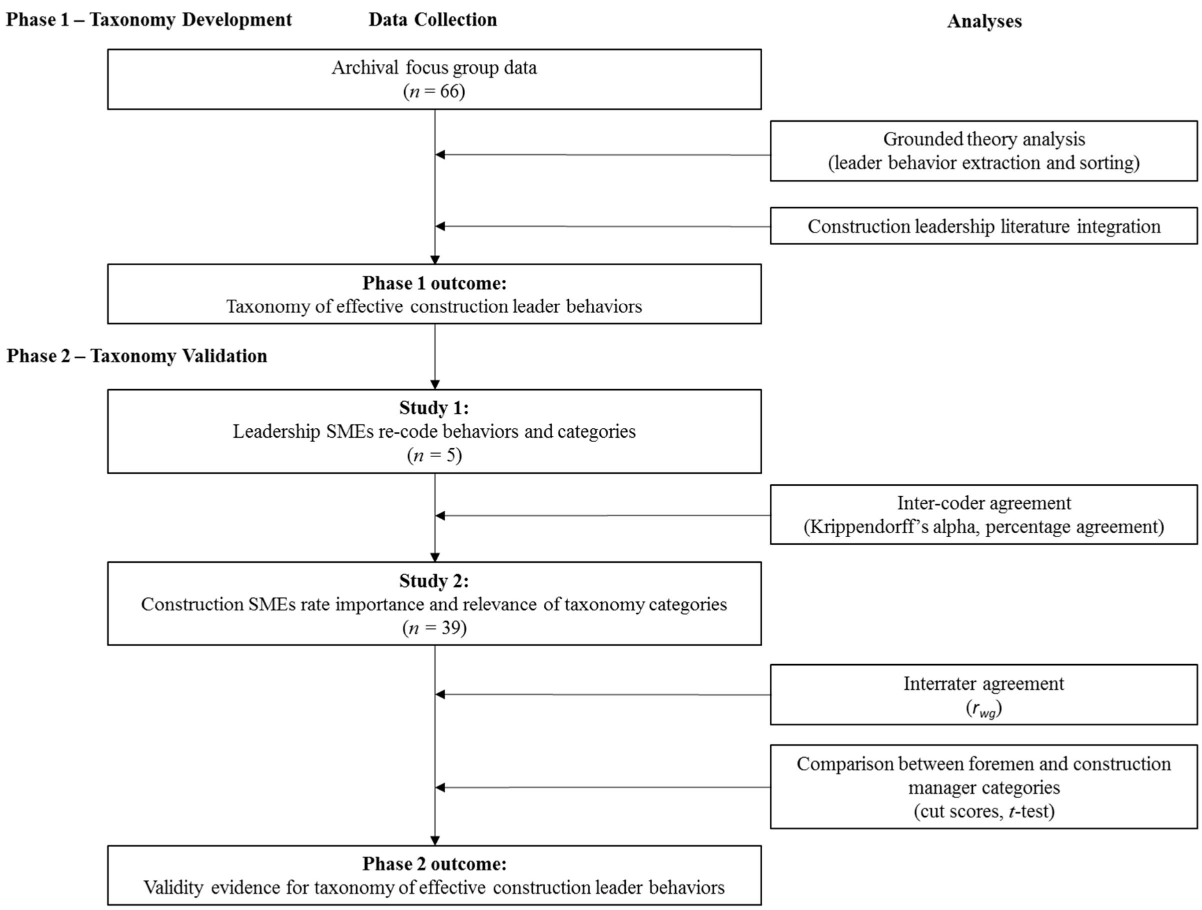


*Figure 1.* A summary of the two-phase taxonomy development and validation process and the analyses performed at each phase.

The first phase entailed a qualitative analysis of archival focus group data to derive a taxonomy of effective construction leader behaviors (CLBs) utilizing a grounded theory approach (Glaser & Strauss, 1965; Corbin & Strauss, 2008). The archival data were from a larger study on leadership in the construction industry (Hoffmeister et al., 2011), which contained transcripts from 10 focus groups with a total of 66 construction professionals at varying levels, ranging from apprentices to safety directors. The categories that emerged from the grounded theory analysis of the focus group transcripts were then bolstered by a substantial review of construction leadership literature which was intended to supplement the taxonomy and identify any CLBs that may be described in the literature but were not mentioned in the focus groups. The outcome at this phase was a taxonomy of effective construction leader behaviors. Thus, the following research questions were addressed in Phase 1:

*Research question 1*: What leader behaviors are considered effective in the construction industry?

*Research question 2*: How can effective leader behaviors be organized into meaningful categories and dimensions?

The second phase of this research effort consisted of two validation studies. First, five Industrial-Organizational Psychology Ph.D. graduate students, who are subject matter experts (SMEs) in leadership, served as coders by re-categorizing CLBs into the categories and dimensions from the first phase. In this study, there were two hypotheses:

*Hypothesis 1*: Coders will demonstrate agreement with each other and with grounded theory analysts on their classification of effective construction leader behaviors into categories.

*Hypothesis 2*: Coders will demonstrate agreement with each other and with grounded theory analysts on their classification of effective construction leader behavior categories into dimensions.

In the second study, 39 construction industry leaders provided frequency and relevance ratings of the categories of CLBs identified in Phase 1 with regards to their use by effective first-line foremen. These data were analyzed for interrater agreement using $r_{wg}$ and $r_{wg(J)}$ (James et al., 1984), which is a measure of rating invariance between raters within a category such that high $r_{wg}$ values reflect similar ratings for each category. Mean ratings for each category were expected to be above 3.00 out of 5.00, criteria that are based on job analysis guidelines from Hughes and Prien (1989). Three construction manager behaviors were also rated by participants. These construction manager behaviors were included as "control" items and were expected to receive lower ratings than CLB categories, thus providing evidence for the external validity of conclusions drawn from the construction leaders' ratings of CLBs are not simply a product of rater bias but are truly relevant and important (Green & Stutzman, 1986). In order to test this effect, comparisons of mean ratings between taxonomy categories and construction manager leader behaviors were conducted. The three hypotheses in this study were as follows:

*Hypothesis 3*: SMEs will demonstrate agreement with regards to their ratings of importance and relevance of effective construction leader behavior categories.

*Hypothesis 4*: SMEs will rate each effective construction leader behavior category as important and relevant to the role of first-line foremen.

*Hypothesis 5*: Effective construction leader behavior categories will be rated significantly higher in terms of importance and relevance than construction manager behavior categories.

# CHAPTER 3

# PHASE 1 - TAXONOMY DEVELOPMENT

## Method

**Participants.** Archival focus group data from the LeAD project (Hoffmeister et al., 2011) were utilized for this phase of the study. The LeAD project was funded by the National Institute of Occupational Safety and Health and sought to identify construction leader behaviors (CLBs) that were effective for improving safety in the construction industry and develop a training program for identified CLBs (Hoffmeister et al., 2011). The LeAD project included three phases: focus groups, validation surveys, and development and evaluation of a leadership training program. The data utilized in Phase 1 came from the focus groups phase, where participants identified effective CLBs.

Ten focus groups were held with 66 unionized plumbers and pipefitters from U.S. Locals 3 and 208 in Denver, Colorado; Local 597 in Chicago, Illinois; superintendents from two construction companies; and safety directors from the Mechanical Contractors Association of America. The purpose of these focus groups was to identify effective CLBs. Participants held positions at various hierarchical levels, including two groups of apprentices ($n$ = 14), one group of journeymen ($n$ = 5), two groups of foremen ($n$ = 14), two groups of instructors ($n$ = 8), two groups of superintendents ($n$ = 16), and one group of safety directors ($n$ = 9; Hoffmeister et al., 2011). Participants' industry tenure was only available for five of the ten focus groups: two superintendent groups and one each of the foremen, journeymen, and apprentice groups. In these five focus groups, the mean industry tenure was 18.31 years ($n$ = 32; $SD$ = 12.49). Demographic information about the participants was unavailable. This sample size is more than double the typical sample of 20 to 30 participants utilizing grounded theory (Charmaz, 2006), lending confidence to the conclusions drawn from these data.

The focus group data were previously analyzed by Hoffmeister et al. (2011), but there are three reasons for why these data were re-analyzed. First, Hoffmeister et al. included knowledge, skills, abilities, and other characteristics along with observable behaviors in their analyses (e.g., "doesn't forget where he came from," "possesses knowledge of the trade," and "has time management skills," Hoffmeister et al., 2011). By re-analyzing the focus group data to only include observable CLBs according to a strict definition, the falsifiability of the results is strengthened. Second, the original study coded the CLBs within the full-range leadership model (Bass, 1985) as a framework. The current research benefits from the atheoretical analysis inherent in grounded theory, which allows for new information to emerge from the data independent from current literature (Corbin & Strauss, 2008). Third, the original analyses were centered on safety leadership as the outcome. The participants in the focus groups were first asked to generate generally effective CLBs rather than safety-specific CLBs, and were only asked which behaviors were most important for safety at the end of each session. The nature of the first prompt allows for generally effective CLBs, including safety-specific CLBs, to emerge from focus group transcripts. These three factors provide sufficient rationale for a re-analysis of the focus group data in order to inductively generate a taxonomy of effective CLBs.

**Materials and procedure.** All 10 focus groups were conducted by the LeAD research team (Hoffmeister et al., 2011) using similar scripts (Appendix A) with only slight variations in word usage, depending on the researcher conducting the focus group. Participants were instructed to provide examples of effective CLBs, and trained on refining their examples if they were not behavioral. For example, if a respondent answered that an effective leader possessed “good communication skills,” they would be encouraged to rephrase “good communication skills” in terms of a specific behavior, such as “he lets the team know that he ordered the materials we need” (Hoffmeister et al., 2011, p. 1). Thus, responses were narrowed down from broad, unobservable statements to observable behavior statements.

After receiving instruction regarding what is considered a behavior, a practice exercise was administered where participants were asked which behaviors would make a football coach a good leader for a football team. Participants shared examples of behaviors and received guidance toward creating observable behavior statements rather than describing knowledge, skills, abilities, or other characteristics. Following this exercise, the researcher asked participants to recall an effective leader they once had and provide behavioral examples of critical incidents where that leader demonstrated effective CLBs. Afterward, participants discussed their list of behaviors as a group and were guided by the researcher who ensured that participant statements were stated as behaviors.

**Grounded theory.** The qualitative analysis used for this study is based on grounded theory (Glaser & Strauss, 1965; Corbin & Strauss, 2008). Grounded theory approaches data analysis from a pragmatist philosophy, conducive to behavioral data and its interpretation (Corbin & Strauss, 2008). Grounded theory is primarily an inductive technique as researchers attempt to compile themes that emerge from the data during the coding process. Rather than utilizing traditional deductive processes where a researcher has pre-existing hypotheses or expectations regarding the nature of the data, grounded theory analysis requires positing questions and then examining the data in order to determine how the data answer the questions. Grounding the analysis in the data results in greater conceptual closeness with the phenomena of interest as compared to deductive theories. Grounded theory analyses may not always contribute new findings, however the inductive approach allows for the potential of new findings to emerge that may not be have been previously proposed by deductive researchers and theorists (Corbin & Strauss, 2008).

This methodology was used to generate categories of effective CLBs that emerged from the focus group data. Three subject matter experts (SMEs) in the subject of leadership in construction served as grounded theory analysts, hereafter referred to as analysts. The first analyst is a doctoral student who developed and conducted an instructional training session, then directed the analysis process. The second analyst is another doctoral student, and the third analyst is an assistant professor. Analysts first extracted CLBs from the focus group transcripts, then categorized CLBs according to similarity, labeled and defined categories, and grouped categories into higher-order dimensions. As qualitative data (e.g., focus group transcripts) were reviewed, individual data points (i.e., CLBs) were grouped together based on conceptual similarity. Categories which represented facets of the phenomena under examination emerged, which contained CLBs within. Next, categories that emerged in the first stage were grouped according to conceptual similarity, resulting in another level of categorization (i.e., dimensions) containing groups of categories. The taxonomy thus has three levels: behaviors, behavioral categories, and behavioral dimensions.

***Behavior extraction.*** Transcripts were reviewed for all ten focus groups. A one-hour calibration session was performed where all three analysts extracted CLBs from two focus groups in order to reach consensus on extraction processes. A CLB was extracted only if it met the following definition: “an observable action that influences another toward a goal.” This definition is based on the APA’s definition of a behavior, which is “the actions by which an organism adjusts to its environment,” (Gerrig & Zimbardo, 2002) and Northouse’s (2014) definition of leadership, which is "a process whereby an individual influences a group of individuals to achieve a common goal" (p. 3).

Based on this definition, analysts discussed and reached consensus before each CLB was included in the data. At the conclusion of this calibration session, the remaining eight focus group transcripts were divided evenly between the first and second analysts, who then extracted CLBs from the transcripts independently. Once independent extraction was complete, the first and second analysts convened to agree upon whether each CLB met the required definition. Disagreements were marked and reviewed by the third analyst during the next stage. Once all CLBs were extracted and agreed upon by the first and second analysts, the third analyst reviewed the list of extracted behaviors in a Microsoft Excel spreadsheet and provided a tie-breaking vote for CLBs where there was disagreement and marked additional behaviors that did not meet the specified definition. Marked behaviors were then discussed among analysts and removed or retained based on consensus. Additionally, any behaviors that were identically redundant with other behaviors were removed.

***Behavior categorization.*** Prior to beginning analyses, the first analyst conducted a one-hour training on grounded theory methodology with the other analysts using material from Corbin and Strauss (2008). The analysis subsequently proceed in three stages: bracketing, initial categorization, and collective categorization. Analysts were instructed to "bracket" (Corbin & Strauss, 2008), where they spent fifteen minutes writing down expectations for what categories may emerge from the data in order to set aside pre-existing beliefs and attempt to analyze in an objective manner. There is debate regarding the validity of this practice (Creswell, 2013), and while bracketing may result in priming of expectations, such biases are likely present regardless of whether they are conscious. The process of bracketing allows the analyst to consider their expectations and consciously steer away from these biases in order to derive an analysis that is purely grounded in the data. After bracketing, the analysts grouped behaviors according to conceptual similarity and assigned category labels to the grouped behaviors.

During the behavior grouping process, the analysts considered various questions in order to view the behaviors from multiple perspectives. These questions were descriptive (e.g., who, what, when, where, why?), spatial (e.g., when, how, how much, how big, open space or closed space?), and temporal (e.g., frequency, duration, timing?; Corbin & Strauss, 2008). These questions represent a progression of sensitizing, theoretical, practical, and guiding themes, and allowed the analysts to construct a more cohesive comprehension of the data than if they were to allow these perspectives to go unacknowledged (Corbin & Strauss, 2008).

At conclusion of training, analysts received an Excel spreadsheet via e-mail containing a randomly ordered list of extracted CLBs. Analysts then proceeded to categorize similar behaviors by pasting them into columns adjacent to the list of extracted behaviors, where each new column represented a category of similar behaviors and contained behavior statements in the rows within. Once each analyst created their own set of emergent categories with behavior statements and assigned labels to the categories, all analysts convened to discuss rationales for their particular arrangements of behaviors and categories. Each analyst had his own collection of categories, hereafter be referred to as an "initial categorization," totaling three initial categorizations. In order to create a collective categorization, each analyst's initial categorization was matched to the others' according to similarities in labeling through discussion and consensus. Next, each behavior statement was assessed to determine whether it was sorted into a matched category or if analysts disagreed. When disagreement occurred, behavior statements were re-categorized based on discussion and consensus. All behavior statements were categorized using this method, resulting in an initial collection of categories of CLBs.

This method was repeated to group behavioral categories into dimensions. The same Excel document was utilized without random ordering, and analysts individually grouped categories together according to conceptual similarity. Analysts then convened to discuss their emergent dimensions and the categories within, which were then compared and agreed upon using discussion and consensus. The final outcome of this process was a taxonomy of CLBs with three levels: behavior statements, categories, and dimensions.

***Literature review and operational definitions.*** After creating the inductively-derived taxonomy, a comparison was made to broader construction leadership literature. An electronic literature search was conducted in the American Society of Civil Engineers, Engineering Village, and EBSCOHost databases, including ProQuest for theses and dissertations. These databases were selected on the grounds that they indexed peer-reviewed articles from top construction leadership journals (e.g., Journal of Construction Engineering and Management). Search terms included: lead*, construction, and behav*. All searches were within the database-indexed subject term "Construction Industry." Articles were reviewed and CLBs with demonstrated relationships to employee or team performance were extracted and categorized into the existing taxonomy. If any CLBs did not fit within an existing category, a new category was created.

The final step of developing a taxonomy is to create rules that allow for the classification of similar behaviors into a single category (Fleishman & Quaintance, 1984). For this step, the first and second analysts created operational definitions for the categories and dimensions based on behavior statements within each category. The first analyst provided the second analyst with a document explaining that operational definitions must be in the form of a task statement and must be directly linkable to behavior statements contained within the category. The two student analysts independently created operational definitions then convened to reach consensus. The third analyst then reviewed the operational definitions and made revisions. The outcome of Phase 1 was an inductively created taxonomy supplemented with CLBs from the construction leadership literature.

**Results**

**Behavior extraction.** The initial extraction of CLBs from focus groups resulted in 398 CLBs. Of these, the first and second analysts agreed upon the inclusion of 391 CLBs, reflecting 98.24% agreement. The third analyst reviewed the full list of 398 CLBs and identified 30 CLBs that did not meet the specified definition. After discussion and consensus among all analysts, 23 of the identified 30 CLBs were removed from subsequent analysis. At the end of the extraction phase, 375 CLBs were extracted from 10 focus groups to be used in the grounded theory analysis.

**Initial categorization.** The categorizations of 375 extracted behaviors performed separately by each analyst resulted in 41 categories created by the first analyst, 14 by the second analyst, and 54 by the third analyst. Differences between the number of categories generated among analysts commonly occur when utilizing grounded theory analysis (Heath & Cowley, 2004), and integration of categories into a single set requires discussion of the nuances that led to the creation of different categories. Subsequent discussion and consensus among the three analysts led to the categorization of 359 CLBs. Analysts were unable to come to a consensus for 16 CLBs. Majority voting resulted in nine split decisions where two analysts out-voted a third analyst. An example CLB where a split decision occurred is “You got to make sure everyone knows what they’re supposed to do,” which received two votes for categorization into *assigning* *and clarifying roles* and one vote for categorization into *giving direction about tasks and goals*. Voting also resulted in six unanimous decisions and one CLB with no agreement. The CLB with no agreement was discussed further until consensus agreement was reached. The comparison of category names, CLBs within each category, and subsequent merging through voting or discussion and consensus resulted in 34 categories of CLBs (Table 2).

**Dimensions.** Each analyst categorized the 34 categories of CLBs into dimensions. Eleven dimensions emerged for the first analyst, seven for the second analyst, and nine for the third analyst. Twenty-nine categories were categorized into similar dimensions across all three analysts (85.29% agreement), and the remaining five categories were then assigned to dimensions based on consensus, resulting in a total of 9 dimensions (Table 2).

**Literature search.** The literature search netted 11 peer-reviewed articles containing effective CLBs. From these articles, 126 CLBs were extracted and categorized by the first analyst into the 34 taxonomy categories. The results of this categorization are found in Appendix B. Two new categories (*innovating* and *interacting with external parties*) emerged after CLBs (e.g., "Pushes innovation actively and vigorously" and "Establishes flow of two-way communication with outside settings," respectively) were unable to be justifiably sorted into existing categories. When coding these new categories into dimensions, *interacting with external parties* was coded into *Building and Promoting Relations*. The new category of *innovation*, however, did not adequately fit within any of the existing dimensions and a new dimension was created for this category.

**Overall taxonomy.** The completed taxonomy with 36 categories within 10 dimensions is presented in Table 2. The 10 dimensions contained between one and nine categories, and included *Adapting and Resolving* (e.g., solving problems, managing interpersonal conflict), *Building and Promoting Relations* (e.g., building and maintaining relationships, promoting teamwork), *Demonstrating Effort and Integrity* (e.g., taking responsibility, communicating honestly), *Developing Followers* (e.g., teaching, mentoring), *Inspiring and Empowering* (e.g., providing autonomy and empowerment, encouraging upward voice and feedback), *Managing Performance* (e.g., monitoring performance, giving constructive feedback), *Planning and Organizing* (e.g., planning and organizing projects, providing material support), *Promoting Safety and Well-being* (e.g., solving safety problems, monitoring and maintaining project site safety), *Providing Support* (e.g., being approachable and available, helping out with tasks), and *Innovating* (e.g., innovating).

Last, operational definitions were created separately by the first and second analysts. The analysts then convened to reach agreement on operational definitions for each category and dimension using discussion and consensus. Operational definitions were then reviewed and revised by the third analyst. The final operational definitions for each category and dimension are presented in Tables 3 and 4 respectively.

Table 2

*Emergent Taxonomy Dimensions, Categories, and Sample Statements of Construction Leader Behaviors*

| Dimension | Categories | Example Construction Leader Behavior |
|---|---|---|
| Adapting and Resolving | | |
| A1 | Solving problems | Corrects problems before they get worse. |
| A2 | Managing interpersonal conflict | Constructively mediates conflicts. |
| A3 | Managing crises and emergencies | Makes tough calls during crisis situations. |
| A4 | Regulating emotions | Expresses outward calm regardless of inner emotional state. |
| Building and Promoting Relations | | |
| B1 | Building and maintaining relationships | Asks workers how they are doing. |
| B2[a] | Interacting with external parties | Establishes two-way communication with outside parties. |
| B3 | Promoting teamwork | Creates a sense of brotherhood. |
| Demonstrating Effort and Integrity | | |
| D1 | Sharing project information | Keeps the crew informed of the status of the job. |
| D2 | Communicating politely in language and tone | Avoids using derogatory language and tones. |
| D3 | Treating employees equally | Consistently treats workers of all levels equally when enforcing rules. |
| D4 | Treating others with respect | Speaks well of contractors and other trades. |
| D5 | Taking responsibility | Takes responsibility for their workers' actions. |
| D6 | Demonstrating work integrity | Practices what they preach. |
| D7 | Demonstrating effort and dedication | Completes work with enthusiasm. |
| D8 | Communicating honestly | Does not hide problems from workers. |
| D9 | Leading by example and modeling | Serves as a role model. |
| Developing Followers | | |
| DF1 | Teaching | Asks questions to ensure workers' understanding of instructions. |
| DF2 | Mentoring | Supports workers' growth and success. |
| Innovating | | |
| I1[a] | Innovating | Vigorously promotes the advantages of new ideas. |

Table 2 continued.

| Dimension | Categories | Example Construction Leader Behavior |
|---|---|---|
| Inspiring and Empowering | | |
| IE1 | Providing autonomy and empowerment | Allows workers to participate in decision-making. |
| IE2 | Motivating and encouraging involvement | Creates effective incentive systems for motivation. |
| IE3 | Encouraging upward voice and feedback | Asks subordinates for their opinion on problems. |
| Managing Performance | | |
| M1 | Communicating roles and expectations | Identifies what each crew member's role is. |
| M2 | Explaining task rationale | Tells workers not only what to do but why they need to do it. |
| M3 | Giving direction about tasks and goals | Gives clear instructions about tasks and goals to avoid duplication of effort. |
| M4 | Monitoring performance | Checks workers' progress throughout the day without interfering. |
| M5 | Giving recognition | Gives workers praise in front of the crew. |
| M6 | Giving constructive feedback | Gives appropriate, specific, and timely feedback. |
| Planning and Organizing | | |
| PO1 | Planning and organizing projects | Coordinates tasks across different crews. |
| PO2 | Providing material support | Ensures workers have necessary tools and equipment. |
| Promoting Safety and Well-being | | |
| PSW1 | Solving safety problems | Intervenes when a job becomes unsafe. |
| PSW2 | Monitoring and maintaining project site safety | Identifies project site hazards. |
| PSW3 | Prioritizing safety and well-being | Prioritizes safety over production goals. |
| Providing Support | | |
| PS1 | Being approachable and available | Is available to talk whenever workers need them. |
| PS2 | Helping out with tasks | Helps workers when they are having difficulty completing a task. |
| PS3 | Providing social support | Supports subordinates' decisions. |

*Note.* [a]These categories emerged from a review and selective coding of leader behaviors found in the construction leadership literature and did not emerge during the analysis of the focus group transcripts.

Table 3

*Operational Definitions for Emergent Categories of Construction Leader Behaviors*

| Category | Operational Definition |
|---|---|
| Solving problems | Addresses the most important problems, provides multiple solutions, and implements the best solution. |
| Managing interpersonal conflict | Mediates and objectively resolves conflicts between workers. |
| Managing crises and emergencies | Acts decisively to resolve emergencies. |
| Regulating emotions | Exhibits temperaments that are appropriate to the situation. |
| Building and maintaining relationships | Develops relationships by getting to know workers individually. |
| Interacting with external parties[a] | Represents the work group well when building relationships with outside parties. |
| Promoting teamwork | Develops a collective mindset by communicating the importance of working as a team and encouraging comradery within and across crews. |
| Sharing project information | Provides workers and stakeholders with project information and status updates. |
| Communicating politely in language and tone | Speaks with workers instead of at workers and avoids harsh or offensive language. |
| Treating employees equally | Consistently treats workers at all levels fairly and does not show favoritism, especially when enforcing rules. |
| Treating others with respect | Communicates with and acts respectfully toward workers, other trades, and contractors. |
| Taking responsibility | Holds themselves accountable for their actions and the actions of their workers. |
| Demonstrating work integrity | Holds themselves to the same standards as workers with regards to work times, well-being, and privileges. |
| Demonstrating effort and dedication | Is prompt, presentable, demonstrates high effort, and exhibits pride in their work. |
| Communicating honestly | Is transparent with workers about all aspects of the project and admits when they do not know something. |
| Leading by example and modeling | Acts as the role model in all aspects of work and safety. |
| Teaching | Takes time to train workers on how to perform tasks, allows workers to try the tasks, then gives corrective feedback and asks questions to make sure workers understand. |
| Mentoring | Coaches workers to help them develop knowledge and skills while sharing their knowledge about the trade. |
| Providing autonomy and empowerment | Delegates authority, allows workers to design their own systems of work, and does not micromanage. |

Table 3 continued.

| Category | Operational Definition |
|---|---|
| Motivating and encouraging involvement | Encourages workers to immerse themselves in job tasks and motivates organizational involvement. |
| Encouraging upward voice and feedback | Asks for and allows workers to offer suggestions, voice their concerns, and ask questions in any situation. |
| Communicating roles and expectations | Assigns roles to workers and clarifies performance expectations. |
| Explaining task rationale | Explains to workers why they are doing each task. |
| Giving direction about tasks and goals | Gives specific and clear directions about task and safety goals, priorities, and instructions, then assigns tasks based on workers' skill level. |
| Monitoring performance | Checks in with workers periodically throughout the workday to assess progress. |
| Giving recognition | Publicly praises and thanks workers often for a job well done. |
| Giving constructive feedback | Provides constructive feedback in a private, timely, and accurate manner. |
| Planning and organizing projects | Reviews the project with workers, engineers, and clients, plans project tasks in advance, and keeps detailed records on progress. |
| Providing material support | Ensures equipment, materials, and safety gear are stocked and ready before workers need to use them. |
| Solving safety problems | Acts quickly to correct safety problems and stops work if conditions are unsafe. |
| Monitoring and maintaining project site safety | Demonstrates the safety of the equipment, actively monitors the project site, and identifies potential safety hazards. |
| Prioritizing safety and well-being | Emphasizes safety and worker well-being over all other project goals. |
| Being approachable and available | Allows workers to come and talk to them whenever they need to, is approachable, and responds to questions in a timely manner. |
| Helping out with tasks | Assists workers as needed or if safety is a concern. |
| Providing social support | Stands up for workers and is flexible about non-work needs and demands. |
| Innovating[a] | Challenges the status quo, champions innovation, and stimulates workers' creativity, support for, and involvement with innovation processes. |

*Note.* [a]These categories emerged from a review and selective coding of leader behaviors found in the construction leadership literature and did not emerge during the analysis of the focus group transcripts.

Table 4

*Operational Definitions for Emergent Dimensions of Construction Leader Behaviors*

| Dimension | Operational Definition |
|---|---|
| Adapting and Resolving | Solves project problems, interpersonal conflicts, and emergencies while maintaining an even temperament. |
| Building and Promoting Relations | Uses interpersonal skills to promote teamwork and build relationships with workers and outside parties. |
| Demonstrating Effort and Integrity | Treats workers fairly and respectfully, shares project information, and models the behavior and demeanor they desire from their workers. |
| Developing Followers | Teaches workers how to do tasks and skills and mentors them in their career development. |
| Inspiring and Empowering | Encourages worker feedback and involvement, delegates authority, and allows for worker autonomy. |
| Managing Performance | Details workers' tasks and roles, monitors worker performance, gives recognition, and provides constructive feedback. |
| Planning and Organizing | Plans the project, organizes project tasks, and equips the project site with necessary materials. |
| Promoting Safety and Well-being | Monitors project site safety, resolves safety problems, and prioritizes worker safety and well-being above all other project goals. |
| Providing Support | Assists workers with tasks, is available, responds to questions, and is flexible concerning nonwork demands. |
| Innovating | Challenges the status quo, champions innovation, and stimulates workers' creativity, support for, and involvement with innovation processes. |

*Note.* [a]These categories emerged from a review and selective coding of leader behaviors found in the construction leadership literature and did not emerge during the analysis of the focus group transcripts.

# CHAPTER 4

## PHASE 2 – TAXONOMY VALIDATION

Support for the validity of the taxonomy developed in Phase 1 was investigated with two subsequent studies. Study 1 involved five doctoral students enrolled in an Industrial-Organizational Psychology Ph.D. program who completed a deductive content analysis to provide evidence for the internal validity of the taxonomy via an assessment of intercoder agreement (Elo & Kyngäs, 2008; Krippendorff, 2004; Vaismoradi, Turunen, & Bondas, 2013). More specifically, subject matter experts (SME) participated in a frame-of-reference (FOR) training (Schleicher, Day, Mayes, & Riggio, 2002) that aimed to elicit a common understanding of (1) the job of a construction foreman, (2) the categories and dimensions that emerged from the grounded theory analysis in Phase 1, and (3) the nature of the coding task via practice and feedback. First, 359 participant statements from focus groups and 126 CLBs from the construction leadership literature used in Phase 1 were converted into task statements and redundancies were eliminated, resulting in 311 CLB task statements. SMEs coded the 311 CLBs into 36 taxonomy categories and then coded the 36 taxonomy categories into 10 dimensions. The purpose of this study was to assess the extent to which SMEs and grounded theory analysts agreed in their categorization of CLBs into categories and categories into dimensions.

Study 2 provided evidence for the external validity of the taxonomy by utilizing a job analysis framework (Brannick, Levine, & Morgeson 2002; Sanchez & Levine, 2012) to attain ratings of importance and relevance of the 36 construction leader behavior (CLB) categories from 39 construction leaders. The leaders' ratings aimed to examine the degree to which construction leaders believed that the taxonomic categories accurately represented behaviors exhibited by effective first-line construction foremen. Their agreement with the relevance and importance of the categories was assessed using an estimate of interrater agreement (James et al., 1984) in conjunction with overall mean ratings for each category.

## Study 1

### Method

**Participants.** Six doctoral students from the Old Dominion University Industrial-Organizational Psychology Ph.D. program were recruited as leadership SMEs. Coders were considered SMEs on the bases of (1) possessing a Master of Science in Industrial-Organizational Psychology and (2) having successfully completed advanced coursework in organizational leadership. Coders were recruited via an e-mail describing the aims of the study and did not receive an incentive for participating. One coder did not complete the coding task and their data were list-wise deleted, resulting in a total sample size of five coders. The final sample included two female and three male SMEs. The average tenure in graduate school was 4.20 years (*SD* = 1.30) and ranged from 3 to 6 years.

**Materials and procedure.**

***Conversion of participant statements to behavior statements.*** Prior to the coding task, 130 CLBs from the construction leadership literature (Appendix B) were added to the total list of CLBs, resulting in a complete list of 483 CLBs from focus groups and literature. The first and third analyst then converted the 483 CLBs into task statements. An example statement that was converted from a focus group participant's quote is "Picks the right battles. If there's a big one, pick that one over the 5 little ones. If it's not a big issue, let it go." That statement was converted to "Addresses the most important problems." Additionally, 140 CLBs that were identically redundant with other CLBs within the same category were removed (e.g., "Mediates disputes" and "manages conflict"). Additionally, 36 CLBs were excluded for not being specific enough (e.g., "They need to take time to assess a situation"). This reduction resulted in a final total of 311 CLBs that were used in the coding task.

***Frame of reference training.*** Coders attended a one-hour frame of reference (FOR) training where 30 behavior statements were coded prior to being assigned the task of coding the remaining 281 CLBs. FOR training is useful for reducing cognitive load, clarifying definitions, approaching processes from a common viewpoint, and improving the accuracy and reliability of categorizations (Schleicher et al., 2002). Prior to training, coders received via e-mail operational definitions of taxonomy categories and an example job description for first-line foremen (Goodhue, 2015; Appendix C).

The FOR training commenced with the first analyst reading operational definitions aloud and providing answers to the coders' clarifying questions. Next, coders received an Excel document containing 10 CLBs randomly selected from the complete list of 311 CLBs. All coders received the same 10 randomly selected CLBs. Adjacent to the CLBs were columns that contained taxonomy category names and definitions. Without any discussion, each coder independently coded 10 CLBs into taxonomy categories. The coders then reconvened and were presented with the analysts' original code for each behavior, an explanation of why the behavior belonged in that category instead of another category, and were given the opportunity to ask clarifying questions. Following the first round of coding, 10 more CLBs were distributed to coders and the process was repeated. A third round of coding was completed via e-mail. The third set of CLBs was sent via e-mail and individual feedback was given to coders when their codes did not match analysts' original codes.

Percentage agreement was used to estimate intercoder agreement during the FOR training. Table 5 displays the frequency of agreement between coders and analysts' original codes for 30 CLBs coded into 36 categories. Full agreement with the original codes occurred eight times (26.7%). Nine instances occurred where four out of five coders agreed with analysts' original codes (30.0%). Five CLBs were coded into a category matching original codes by three coders (16.7%), which also occurred for another five CLBs where two coders agreed with the original codes (16.7%). Two CLBs only had the agreement of one coder (6.7%) and one CLB was not coded into the original category by any coder (3.3%).

Percentage agreement between coders and the analysts' original codes for the first 10 CLBs was 58%. Agreement between coders and the analysts' original codes for the second and third rounds of coding were 76% and 72%, respectively, indicating an improvement. Across the three rounds, the percentage agreement between the codes of the five trainees and the analysts' original codes for the FOR training was 69%. The majority of coders (at least 3 out of 5) agreed on 73% of the behaviors.

Table 5

*Frame of Reference Training Agreement Frequencies*

| Coder Agreement | Number of CLBs | Percentage of CLBs |
|---|---|---|
| With original code | | |
| 5 out of 5 | 8 | 26.7 |
| 4 out of 5 | 9 | 30.0 |
| 3 out of 5 | 5 | 16.7 |
| 2 out of 5 | 5 | 16.7 |
| 1 out of 5 | 2 | 06.7 |
| 0 out of 5 | 1 | 03.3 |

*Note. N* = 5. CLB = Construction leader behavior.

***Coding task.*** After the FOR training, coders received an Excel document via e-mail with instructions for completing the coding task. The first column in the Excel document contained the remaining 311 CLBs that were not part of the FOR training in a random order. Above the

CLBs were cells containing category names with operational definitions visible via a hovering pop-up notification. Each category had an identifying number which served as a codebook. The order of categories in the codebook varied randomly for each coder to diminish any systematic order effects from reading categories when coding. For each CLB, coders entered the number of the category in which they believed the CLB statement belonged in the adjacent cell. After a code was entered, the cell adjacent to the code auto-populated the category name assigned to the code to provide confirmation that their code matched the intended category. Completed Excel documents were returned via e-mail. On average, coders took approximately 15 days to code behaviors into categories.

After completing the first task, coders received a second Excel document with instructions to sort the 36 categories into the 10 dimensions. The layout of the second document was identical to the first. The first column of the document contained randomly ordered category labels, above which were dimension labels, operational definitions, and identifying codes that differed by coder. Coders were permitted to review operational definitions from the previous document when categorizing into dimensions. The average time for completion of the second coding task was two days.

**Results**

**Arrangement of the data.** Coded CLBs were first recoded to undo randomization and copied from Excel into SPSS. The first column of the SPSS data file contained CLBs, the second column contained codes corresponding to where the CLBs were originally coded, and the next five columns contained codes corresponding to the categories where coders coded the CLBs. Column eight contained the content analysts' original codes for the dimension in which each category was coded. Columns nine through thirteen contained codes corresponding to the dimensions into which each coder coded a category.

**Intercoder agreement.**

***Agreement indices.*** Krippendorff's alpha (1971, 2004) and percentage agreement were calculated to assess intercoder agreement following literature recommendations (Lombard, Snyder-Duch, & Bracken, 2002). It is suggested to report multiple estimates of intercoder agreement since each index has strengths and weaknesses (Lombard et al., 2002).

Krippendorff's alpha (1971, 2004) is a measure of agreement that factors in the potential for chance agreement and subtracts it from the agreement index. Krippendorff's alpha assesses observed disagreement and divides it by expected disagreement then subtracts this quotient from 1 to arrive at the alpha value. Krippendorff (2004) states that a Krippendorff's alpha value of 0.80 is an acceptable magnitude for the statistic and .667 is the absolute minimum for drawing any conclusions. However, De Swert (2012) argues that selecting a universally acceptable Krippendorff's alpha is arbitrary due to a decrease in magnitude of the statistic as the difficulty of the coding task increases. Given the cognitive load and difficulty of sorting 341 behaviors into 36 categories, Krippendorff's alpha in this study might have been attenuated.

Percent agreement is typically viewed as a less robust measure of agreement, largely due to its potential for researchers to capitalize on chance when reporting agreement (Sim & Wright, 2005). However, the probability of a coder randomly coding a single CLB into the same category as another coder is 1 out of 36 (2.78%) which suggests that the probability of chance agreement is very low and that a high percentage agreement is likely due to true agreement. Thus, percentage agreement was also included as an estimate of intercoder agreement.

***Data cleaning.*** Prior to calculating intercoder agreement indices, CLBs with low agreement were examined for quality. "Low agreement" was defined as any instance where fewer than three coders agreed on a code for a CLB. Thirty-three instances of low agreement were identified and reviewed for quality. Of the 33 CLBs with low agreement, 18 CLBs were identified as "low quality" for being either double-barreled or non-specific and were thus flagged. An example of a double-barreled CLB is "communicates clearly in stressful situations." Since this CLB provides the context of a stressful situation and the behavior of communicating clearly, it could reasonably be coded into either *communicating honestly* or *managing change and emergencies*, thus making it double-barreled. An example of a non-specific CLB was "makes sacrifices for his workers." Considering this study's definition of a leader behavior (i.e., an observable action that influences another toward a goal), this CLB does not qualify on the grounds that it does not clearly describe an observable action and is thus non-specific. A complete list of all double-barreled and non-specific CLBs that were flagged and an explanation for their flagging can be found in Tables 6 and 7.

The remaining 15 CLBs with low agreement likely reflected true disagreement with the original codes and were retained. An example of true disagreement was "allows workers to participate in decision-making." This was originally coded into *encouraging upward voice and feedback*, yet two coders coded it into *providing autonomy and empowerment*. It can be reasonably argued that participation in decision making both provides empowerment and encourages upward voice. This is differentiated from a double-barreled item such that the difference between the coders' decisions is not driven by language that is clearly divisible into two categories (e.g., *solving problems* and *innovating* as in the preceding example) but is rather motivated by conceptual differences in coders' interpretations of the CLB. No instances of low agreement occurred when SMEs coded categories into dimensions.

Table 6

*Double-Barreled Construction Leader Behavior Statements*

| No. | Construction Leader Behavior Statement | Category 1 | Category 2 |
|---|---|---|---|
| 24 | Communicates clearly in stressful situations. | Communicating honestly | Managing change and emergencies |
| 64 | Enforces safety rules fairly. | Prioritizing safety and well-being | Treating workers equally |
| 91 | Sets up the project site on time every day. | Demonstrating effort and dedication | Planning and organizing projects |
| 185 | Sets a measurable standard of excellence. | Leading by example and modeling | Communicating roles and expectations |
| 186 | Sets a standard for quality and safety at the start of the project. | Giving direction about tasks and goals | Monitoring and maintaining project site safety |
| 192 | Creates tasks and goals that are aligned with organizational vision. | Communicating roles and expectations | Giving direction about tasks and goals |
| 207 | Tells workers which gear is appropriate for their task. | Teaching | Giving direction about tasks and goals |
| 260 | Ensures workers who do not speak English understand safety rules and procedures. | Teaching | Monitoring and maintaining project site safety |
| 268 | Checks on workers after an injury. | Prioritizing safety and well-being | Building and maintaining relationships |

*Note.* No. = Identifying number for a behavior statement.

Table 7

*Non-Specific Construction Leader Behavior Statements*

| No. | Construction Leader Behavior Statement | Reason |
|---|---|---|
| 8 | Makes necessary adjustments after checking progress. | Does not specify actions |
| 51 | Improves the crew's problem-solving ability. | Does not specify actions |
| 79 | Acts consistently with words. | Does not specify actions |
| 84 | Does not make unreasonable demands. | Does not specify demands |
| 131 | Teaches others to look at problems from multiple perspectives. | Does not specify perspectives |
| 155 | Effectively markets organizational initiatives to workers. | Does not specify initiatives |
| 230 | Intervenes when work is not being done correctly. | Does not specify incorrect versus unsafe work |
| 288 | Makes sacrifices for his workers. | Does not specify actions |
| 289 | Makes sure workers feel comfortable on the job. | Does not specify actions |

*Note.* No. = Identifying number for a behavior statement.

***Results for agreement indices.***

*Agreement frequencies.* Frequencies for different levels of agreement are presented in Tables 8, 9, and 10. Table 8 contains frequencies for the coding of 311 CLBs into 36 categories. There were 116 CLBs (37.30%) where coders unanimously coded the CLB into a category that matched the analysts' original code. This number was similar when assessing agreement within coders which was accomplished by comparing codes to the modal code for each CLB. Unanimous agreement between coders occurred for 118 CLBs which is a discrepant with the 116 CLBs in which coders unanimously agreed with the analysts. This discrepancy was due to two CLBs where coders unanimously disagreed with analysts. The CLB "is inclusive of all workers" was categorized under *treating workers with respect* by analysts, but unanimously under *treating workers equally* by coders. Likewise, "informs workers of project size hazards" was categorized under *solving safety problems* by analysts and unanimously under *monitoring and maintaining project site safety* by coders.

Table 8

*Agreement Frequencies for Coding Construction Leader Behaviors into Categories*

| Coder Agreement | Number of CLBs | Percentage of CLBs |
|---|---|---|
| With original code | | |
| 5 out of 5 | 116 | 37.30 |
| 4 out of 5 | 76 | 24.44 |
| 3 out of 5 | 48 | 15.43 |
| 2 out of 5 | 34 | 10.93 |
| 1 out of 5 | 26 | 8.36 |
| 0 out of 5 | 11 | 3.54 |
| With modal code | | |
| 5 out of 5 | 118 | 37.94 |
| 4 out of 5 | 85 | 27.33 |
| 3 out of 5 | 75 | 24.12 |
| 2 out of 5 | 30 | 9.65 |
| 1 out of 5 | 0 | 0.00 |
| 0 out of 5 | 3 | 0.96 |

*Note.* $N = 5$. CLB = Construction leader behavior.

The remaining frequencies for degree of agreement with original analysts' codes ranged from 76 (24.44%) for 4 out of 5, to 48 (15.43%) for 3 out of 5, to 34 (10.93%) for 2 out of 5, to 26 (8.36%) for 1 out of 5. Last, there were 11 CLBs (3.54%) where no coders agreed with the original analysts' codes. Overall percentage agreement with original codes was 72.15% (Table 11). Agreement after the removal of 18 low-quality CLBs is presented in Table 9. Removing low-quality CLBs reduced frequencies for cases where two or fewer coders agreed with the original codes, resulting in 29 CLBs (9.32%) where 2 out of 5 coders agreed with the original codes, 14 CLBs (4.50%) for 1 out of 5, and 10 (3.22%) for 0 out of 5.

Table 9

*Agreement Frequencies for Coding Construction Leader Behaviors into Categories after Removing 18 Low-Quality Construction Leader Behavior Statements*

| Coder Agreement | Number of CLBs | Percentage of CLBs |
|---|---|---|
| With original code | | |
| 5 out of 5 | 116 | 37.30 |
| 4 out of 5 | 76 | 24.44 |
| 3 out of 5 | 48 | 15.43 |
| 2 out of 5 | 29 | 9.32 |
| 1 out of 5 | 14 | 4.50 |
| 0 out of 5 | 10 | 3.22 |
| With modal code | | |
| 5 out of 5 | 118 | 37.94 |
| 4 out of 5 | 85 | 27.33 |
| 3 out of 5 | 75 | 24.12 |
| 2 out of 5 | 15 | 4.82 |
| 1 out of 5 | 0 | 0.00 |
| 0 out of 5 | 0 | 0.00 |

*Note.* $N = 5$. CLB = Construction leader behavior.

The difference in percentage agreement between the original codes and the coders' modal code is driven by mismatch between the modal code for each CLB and the original category in which it was coded. One example of a mismatch between coders' modal code and the original categorizations is the CLB "seeks multiple perspectives when solving problems," which was originally coded into *taking responsibility* by the analysts, but was coded into *encouraging upward voice and feedback* by four out of five coders. This mismatch occurred in 54 cases (17.36%). Additionally, four CLBs (1.29%) did not have a mode because there was zero agreement between coders. Of the 54 CLBs with a mismatch between modal code and the original code, 14 of these were low-quality CLBs. Of the four CLBs that did not have a mode, three were low-quality CLBs. After removing low-quality CLBs, the frequency of mismatch between the mode and the original analysts' code is 36 out of 293 (12.29%) and there remains one instance of total disagreement among coders (0.34%).

Agreement frequencies for coding categories into dimensions are presented in Table 10. Frequencies are identical between agreement with original codes and agreement with the modal code due to 100% match between the modal code and the original codes. Nevertheless, there were 21 instances (58.33%) where 5 out of 5 coders agreed, 14 instances (38.89%) where 4 out of 5 agreed, and 1 (2.78%) instance where 3 out of 5 agreed. This singular case was the category *regulating emotions*, which was coded into the dimension *Adapting and Resolving* by the original analysts and three coders, but was coded into the dimension *Building and Promoting Relations* by one coder and *Demonstrating Effort and Integrity* by a second coder.

Table 10

*Agreement Frequencies for Coding Construction Leader Behavior Categories into Dimensions*

| Coder agreement | Number of categories | Percentage of categories |
|---|---|---|
| With original code | | |
| 5 out of 5 | 21 | 58.33 |
| 4 out of 5 | 14 | 38.89 |
| 3 out of 5 | 1 | 2.78 |
| With modal code | | |
| 5 out of 5 | 21 | 58.33 |
| 4 out of 5 | 14 | 38.89 |
| 3 out of 5 | 1 | 2.78 |

*Note.* $N = 5$. There were no instances where two or fewer coders agreed with original or modal codes.

*Intercoder agreement*. In order to further examine intercoder agreement, an analysis was performed in SPSS using the Krippendorff's alpha macro (Hayes & Krippendorff, 2007). For the task of coding 293 CLBs into 36 categories, Krippendorff's alpha was .63, which is below the recommended minimum of .667 (Krippendorff, 2004) for drawing tentative conclusions. After removing 18 low quality CLBs, Krippendorff's alpha was .67, thus meeting guidelines for tentative conclusions set by Krippendorff (2004). This result provides support for Hypothesis 1, which proposed that coders would agree with each other on their classification of effective CLBs into categories. For the coding of categories into dimensions, Krippendorff's alpha was .80, which Krippendorff states as an acceptable level for drawing tentative conclusions about the data. This supports Hypothesis 2, which proposed that coders would agree with each other on their classification of effective CLB categories into dimensions.

The revised overall percentage agreement with original analysts' codes after removing low-quality CLBs was 75.09% (Table 11). This result provides support for Hypothesis 1, which stated that coders would demonstrate agreement with analysts' original codes.

Coders' agreement with modal codes was slightly higher on average, and ranged from 85 CLBs (27.33%) for 4 out of 5 coders agreeing with the mode, to 75 (24.12%) for 3 out of 5, to 30 (9.65%) for 2 out of 5, to 0 CLBs for 1 out of 5, and 3 for 0 out of 5 (0.96%). Overall percentage agreement with the modal code was 78.14% (Table 11). After removing 18 low-quality CLBs, the instances of agreement where 2 out of 5 agreed dropped from 30 (9.65%) to 15 (4.82%), and instances where 0 out of 5 agreed dropped from 3 (3.22%) to 0 (0.00%). The removal of the 18 low-quality CLBs improved percentage agreement with modal codes to 80.89%, which provides additional support for Hypothesis 1.

Overall agreement for the categories into dimensions was 91.11% (Table 11), providing support for Hypothesis 2.

Table 11

*Agreement Statistics for the Deductive Coding Task*

| Coding Phase | Items Coded | % Agree with original codes | % Agree between coders | Krippendorff's alpha |
|---|---|---|---|---|
| CLBs into Categories I | 311 | 72.15 | 78.14 | .63 |
| CLBs into Categories II[a] | 293 | 75.09 | 80.89 | .67 |
| Categories into Dimensions | 36 | 91.11 | 91.11 | .80 |

*Note*. $N = 5$. CLB = Construction leader behavior. % Agree = Percentage agreement. Categories were coded into 10 dimensions. [a]Revised statistics after removing 18 low quality construction leader behavior statements.

## Study 2

### Method

This study attempted to validate the taxonomy developed in Phase 1 using SMEs who currently hold leadership positions in the construction industry. Whereas validation Study 1 provided evidence of the internal validity regarding the classification of CLBs and the structure of the taxonomy, Study 2 sought to provide evidence for external validity of the taxonomy via ratings of importance and frequency from real-world construction leaders. Three hypotheses were proposed for Study 2. Hypothesis 3 stated SMEs would demonstrate agreement with regards to their ratings of importance and relevance of effective construction leader behavior categories. Hypothesis 4 stated SMEs would rate each effective construction leader behavior category as important and relevant to the role of first-line foremen. Hypothesis 5 stated that effective construction leader behavior categories will be rated significantly higher in terms of importance and relevance than construction manager behavior categories.

#### Participants.

***Sample size requirements.*** There is no consensus in the job analysis literature regarding how many raters are needed to achieve an adequate estimate of interrater agreement (Dierdorff & Wilson, 2003; Sanchez & Levine, 2012; Voskuijl & van Sliedregt, 2002), and sample sizes can vary depending on the purpose of the project and practical limitations (Dierdorff & Wilson, 2003). One of the practical limitations of this study is the difficulty of recruiting qualified construction leaders, as evidenced by a median sample size of 68 in reviewed construction leadership studies (e.g., Adams, 2007; Andi, Santoso, Simanjuntak, 2008; Biggs et al., 2013; Bossink, 2004; Bresnen et al., 1986; Bryman et al., 1987; Chan, 2005; Dulaimi & Langford, 1999; Dulaimi et al., 2005; Giritli & Oraz, 2004; Leung et al., 2010; Limsila & Ogunlana, 2008; McCabe et al., 2008; Melia & Becerril, 2007; Mohamed, 2002; Naoum et al., 2004; Rowlinson et al., 1993; Skipper & Bell, 2006; Siu et al., 2004; Sunindijo et al., 2007; Traibherm, 2003).

One sample size recommendation comes from Kane, Miller, Trine, Becker, and Carson (1995), who presented estimates of the change in error variance depending on the numbers of raters and items rated. When there are 40 rated items, the estimated absolute error variance ranges from .006 for 300 participants to .007 for 200, to .010 for 100, to .015 for 50, and .030 for 20 participants. Given the difficulty of recruiting this population, the target sample size was 50 participants, representing a compromise between practicality and minimization of error variance. The difference in absolute error variance between 50 and 300 participants is 0.9%, which is acceptable in exchange for recruiting 250 fewer participants of a difficult to reach population.

***Recruitment.*** Representatives from 10 construction-related unions (e.g., Carpenters Industrial Council, International Brotherhood of Electrical Workers) and 9 professional construction associations (e.g., Retail Contractors Association, Construction Management Association of America) were contacted to assist in recruitment for the study via publicly available e-mail addresses retrieved from their websites. These organizations were identified via a Google search for construction unions and professional construction associations. Representatives were asked to nominate experienced, formal leaders who have demonstrated exceptional performance as a leader. The response rate for these initial attempts was 0%, and follow-up e-mails were sent one week after the initial e-mails. One response was received to the follow-up e-mails (5.26% response rate) from the Construction Employers' Association (CEA). The CEA did not opt to participate in the study, but asked four questions that were then included in subsequent recruitment e-mails. Recruitment, reminder, and revised recruitment e-mails are presented in Appendix D.

After failing to recruit nominations via unions and professional associations, construction organizations were identified using Engineering News-Record's (ENR) 2014 listing of the top 400 construction industry contractors. From this list, 203 organizations were contacted via publicly available e-mail addresses. Seven organizations of the 203 contacted provided nominations (3.45% response rate). The representatives provided e-mail addresses of 68 nominated leaders to the first analyst, who then contacted nominees to participate. One organization opted to distribute the survey link to nominees directly and thus the number of nominees for that organization is unknown.

In addition to recruitment from the ENR top 400, a brief description of the study and a survey link to provide nominations was posted to construction-related groups on LinkedIn (e.g., Linking Construction, Construction Who's Who). Five nominations from two organizations were received via this method. An additional three nominations were received via personal contacts of the third analyst. The total known number of nominations was 76 nominees representing 12 organizations.

***Sample.*** In order to qualify for the study, participants needed to have a job title that reflected management or leadership in some capacity, drawn from a sample of O*NET (2015c) job titles (e.g., foreman, superintendent, construction manager, field supervisor, and safety director) and have a minimum of five years of construction industry tenure. These criteria, along with the condition that they were nominated as exceptional leaders, served to ensure that the recruited participants were in fact experts in the subject matter of construction leadership.

Fifty-two of the 76 nominated construction industry SMEs participated in the online survey (68.42% response rate). Three participants were list-wise deleted for invariant responding, one was deleted for reporting zero years of experience as a foreman or supervising foremen, and one was deleted for reporting zero years of experience in the construction industry. Eight participants did not complete the survey, and averaged 7.13 ratings out of 39, ranging from 1 to 24 ratings provided. These eight respondents were list-wise deleted since they did not complete questions assessing the extent of their experience in construction, which could not be assumed given the previous list-wise deletion of two participants who reported limited or no experience in the construction industry. The final sample size was 39 participants recruited from 12 construction organizations in the United States.

The participants had a mean construction industry tenure of 25.36 years ($SD = 9.45$), ranging from 5 to 46 years. On average they had 8.62 years of experience as a foreman ($SD = 7.47$), ranging from 0 years to 30 years. Participants had an average of 7.69 years ($SD = 7.83$) of experience directly supervising foremen, ranging from 0 years to 27 years. The average tenure in participants' current position was 5.99 years ($SD = 6.33$) and ranged from six months to 36 years.

The most commonly reported trade was pipefitting and steamfitting (25.6%), followed by "other" (23.1%) and carpentry (20.5%). Job titles were coded post-hoc according to the presence of the terms manager, director, foreman, vice president, superintendent, or instructor. The most frequently reported job title reflected management (e.g., functional area manager, construction manager). The full breakdown of trades and job titles is presented in Table 12.

Table 12

*Trades and Job Titles of Participants as a Percentage of the Sample*

| | Percent |
|---|---|
| Trade | |
| Pipefitting and Steamfitting | 25.6 |
| Other | 23.1 |
| Carpentry | 20.5 |
| Electrician | 15.4 |
| Cement Masonry/Concrete Finishing | 2.6 |
| Dredge Operation | 2.6 |
| Excavator, Loading Machine | 2.6 |
| Roofing | 2.6 |
| Structural Metal Fabrication | 2.6 |
| Taping Drywall | 2.6 |
| Job Title | |
| Manager | 35.9 |
| Director | 28.2 |
| Foreman | 10.3 |
| Vice President | 10.3 |
| Superintendent | 7.7 |
| Instructor | 5.1 |
| Other | 2.6 |

*Note.* $N = 39$.

**Validity.** One of the challenges in job analysis is assessing the accuracy of job analysis data (Sanchez & Levine, 2000). Common methods include assessing interrater agreement among SMEs and comparing differences between mean ratings and expected true scores (Sanchez & Levine, 2000). Interrater agreement has been criticized as a method due to the confound of true disagreement with differences in how individuals perform their jobs, as ratings have been found to differ across levels of experience and tenure (Cain & Green, 1983; Landey & Vasey, 1991; Sanchez & Levine, 2012). One potential solution is to use an effective construction leader as a referent rather than asking participants to rate the frequency and importance of their own behaviors, given that self-ratings of leadership are biased by factors such as gender, age, race, personality, job level, and experience (Fleenor, Smither, Atwater, Braddy, & Sturm, 2010).

Another approach to assess the external validity of data that has shown to be effective in the training evaluation context (Cigularov, Chen, Thurber, & Stallones, 2008; Frese, Beimel, & Schoenborn, 2003) and has potential application to job analysis and taxonomy validation, is the non-equivalent dependent variable design (Cook & Campbell, 1979), also known as the internal referencing strategy (IRS; Haccoun & Hamtiaux, 1994). In the training evaluation context, the IRS approach entails assessing relevant but non-trained outcomes in addition to trained outcomes and examining if the training differentially affects the trained and untrained outcomes. This approach was applied to this taxonomy validation effort by including in the SME survey additional CLB categories founded in construction manager job tasks (O*NET, 2015a), which were related to first-line foremen by virtue of being in the same industry but were not explicitly part of the foreman role. Whereas foremen move from one project site to another in order to complete a phase relating to their specialty (e.g., carpentry), construction managers interface with clients and oversee a single project site from inception to completion. Additionally, foremen directly interact and manage workers whereas construction managers are further removed from the workers and instead manage the project (Goodhue, 2015).

By comparing ratings of taxonomy (i.e., foreman) categories to construction manager "control" categories, an argument could be made that if taxonomy category ratings were found to be significantly higher than construction manager category ratings, then the taxonomy category ratings represented true relevance and importance rather than acquiescence or any other leadership rating bias. Following the above, participants were asked to rate a total of 39 categories (36 taxonomy categories and 3 "control" categories) based on an external referent.

***Materials and procedure.*** Data were collected via an online survey created in Qualtrics. Participants were provided with a description of the study via e-mail, a brief explanation of the process through which they were nominated, and instructions to consider effective leadership in the construction industry when rating the categories (Appendix E). Participants were presented with one randomly selected taxonomy category per page and an operational definition of the category for which they provided ratings of relevance and frequency with respect to the job of a first-line foreman (Appendix E). Participants were presented with an alert if they failed to provide a rating for a category, but ratings were not mandatory.

Additionally, three categories of construction manager behaviors were rated by participants in addition to rating the 36 taxonomy leadership categories. The construction manager categories and their operational definitions were derived from O*NET (2015a). These included (1) managing labor, (2) budgeting, and (3) developing and implementing project site programs. The operational definition for *managing labor* was "determines labor requirements for dispatching workers to construction sites." *Budgeting* was operationally defined as "prepares and submits budget estimates, progress reports, and cost tracking reports." *Developing and implementing project site programs* was operationally defined as "develops or implements quality control and environmental protection programs."

These three "control" categories were selected on the basis that they did not emerge as behavioral categories in the CLB taxonomy and were not identified as tasks on the O*NET (2015b) list of tasks for first-line foremen. More specifically, the construction manager categories were identified based on a review and comparison between the 20 O*NET (2015a) tasks listed for construction managers and the 15 O*NET (2015b) tasks listed for first-line foremen. Each of the 20 construction manager tasks were assessed for their potential to overlap with the role of a first-line foreman. An example construction manager task statement that overlaps with a first-line foremen task is “contract or oversee craft work, such as painting or plumbing” (O*NET, 2015a), which overlaps with the first-line foreman task “supervise, coordinate, or schedule the activities of construction or extractive workers” (O*NET, 2015b) in that they both involve supervision of construction workers. Thus, the three categories selected reflected a subjective judgment that they represented the least amount of overlap between construction managers and first-line foremen. Testing for a difference between the mean ratings for construction manager items and taxonomy categories would lend support to the claim that the taxonomy was specific to first-line foremen rather than representative of generally effective construction leadership.

Participants rated importance using a scale modified from Lindell, Clause, Brandt, and Landis (1998) from 1 to 5: 1 (*unimportant*), 2 (*slightly important*), 3 (*moderately important*), 4 (*very important*), and 5 (*crucially important*). Relevance was rated using a 5-point scale, which included 1 (*irrelevant*), 2 (*slightly relevant*), 3 (*moderately relevant*), 4 (*very relevant*), to 5 (*extremely relevant;* Haladyna & Rodriguez, 2013). Background information was collected about trade, job title, number of years supervising foremen, number of years as a foreman, and industry tenure.

A criticality composite score was calculated using a formula adapted from Pulakos, Arad, Donovan, and Plamondon (2000) - [(2x Importance) + Relevance / 3]. This formula weighted importance twice as much as relevance while still considering how applicable the behavior category was to the role of the first-line foreman. Anchors were applied post-hoc for the purposes of interpretation using a modified scale (Vagias, 2006) - 1 (*no criticality*), 2 (*low criticality*), 3 (*medium criticality*), 4 (*high criticality*), to 5 (*essential criticality*).

**Results**

**Interrater agreement.** Two measures of interrater agreement were assessed. The first was $r_{wg}$ (James et al., 1984), which is used for single item measures of constructs. Since each taxonomic category represents a distinct category of behavior, $r_{wg}$ was calculated for each taxonomic category on importance and relevance. In addition, because the taxonomy represented a behavioral model of effective leadership in construction as a whole, $r_{wg(J)}$ was assessed for the entire taxonomy on importance and frequency. Criticality was excluded since it was a composite score and thus was not directly rated by participants. The slightly negatively skewed distribution was selected as a comparison rating distribution, which is the preferred comparison distribution when leniency bias is expected (LeBreton & Senter, 2008) and for leadership research (Schriesheim, Cogliser, & Neider, 1995). Agreement estimates using the null distribution as a comparison are also included in the results, however LeBreton and Senter (2008) strongly discourage the use of the null distribution which does not realistically reflect typical distributions and thus inflates agreement estimates. Hypothesis 3 stated that participants would demonstrate agreement with regards to their ratings of importance and relevance of effective construction leader behavior categories. The strength of agreement was gauged using LeBreton and Senter's guidelines for interrater agreement using $r_{wg}$ which range from .31 to .50 for weak agreement, .51 to .70 for moderate agreement, .71 to .90 for strong agreement, and .91 to 1.00 for very strong agreement.

Both $r_{wg}$ and $r_{wg(J)}$ were calculated in SPSS using syntax provided by LeBreton and Senter (2008). Table 13 contains frequencies for interrater agreement ratings of each taxonomy category by level of agreement within the framework of LeBreton and Senter's (2008) guidelines. Overall, agreement was adequate as participants reached at least moderate agreement for 93.06% of importance ratings and 80.56% of relevance ratings when averaging across skewed and uniform $r_{wg}$ values. . Additionally, ratings for relevance generally had lower estimates of interrater agreement than ratings for importance. For slightly negatively skewed estimates for ratings of relevance, 36.1% of all categories were classified as weak agreement whereas 13.9% were classified as such for importance.

Table 13

*Categorical Interrater Agreement Frequencies for Taxonomy Ratings*

| | | Importance | | | | Relevance | | | |
|---|---|---|---|---|---|---|---|---|---|
| Level of agreement | $r_{wg}$ | $r_{wg}$ Skewed | % | $r_{wg}$ Uniform | % | $r_{wg}$ Skewed | % | $r_{wg}$ Uniform | % |
| Very strong agreement | .91 to 1.00 | 1 | 2.78 | 2 | 5.6 | 0 | 0.0 | 0 | 0.0 |
| Strong agreement | .71 to .90 | 14 | 38.9 | 26 | 72.2 | 5 | 13.9 | 13 | 36.1 |
| Moderate agreement | .51 to .70 | 16 | 44.4 | 8 | 22.2 | 17 | 47.2 | 23 | 63.9 |
| Weak agreement | .31 to .50 | 5 | 13.9 | 0 | 0.0 | 13 | 36.1 | 0 | 0.0 |
| Lack of agreement | .00 to .30 | 0 | 0.0 | 0 | 0.0 | 1 | 2.8 | 0 | 0.0 |

*Note.* $N = 39$. Guidelines for level of agreement derived from LeBreton and Senter (2008).

Table 14 presents $r_{wg}$ for each category and ranked by $r_{wg}$ value for ratings of importance with the slightly negatively skewed distribution as a comparison. For importance ratings with the uniform distribution as a comparison, *prioritizing safety and well-being* and *monitoring and maintaining project site safety* had the highest agreement with $r_{wg}$ values above .91, indicating very strong agreement (LeBreton & Senter, 2008). The next 26 categories (e.g., *taking responsibility*, *managing interpersonal conflict*, and *regulating emotions*) had $r_{wg}$ values ranging from .71 to .90, indicating strong agreement. The remaining eight categories (e.g., *innovating*, *teaching*, and *providing social support*) had $r_{wg}$ values suggestive of moderate agreement, ranging from .55 to .70. For relevance ratings with the uniform distribution as a comparison, no categories met the criteria for very strong agreement and 13 categories (e.g., *solving safety problems*, *taking responsibility*, and *giving direction about tasks and goals*) fell within the range of strong agreement, ranging from .70 to .88. The remaining 22 categories (e.g., *solving problems*, *demonstrating work integrity*, and *treating workers equally*) had $r_{wg}$ values in the range of moderate agreement, ranging from .51 to .69.

When adjusting the $r_{wg}$ reference from the uniform to the slightly negatively skewed distribution, the average decrease in $r_{wg}$ was .11 for importance and .15 for relevance. Using the slightly negatively skewed distribution resulted in changes in the agreement levels of various categories. For importance ratings, *monitoring and maintaining project site safety* fell from very strong agreement to strong agreement. Thirteen categories fell from strong agreement to moderate agreement (e.g., *giving recognition*), and five categories (e.g., *building and maintaining relationships*) fell to the range of weak agreement from moderate agreement (LeBreton & Senter, 2008). For ratings of relevance, 8 categories moved from strong to moderate agreement (e.g., *communicating honestly*), 14 categories (e.g., *planning and organizing projects*, *mentoring*) moved from moderate to weak agreement and one category, *building and maintaining relationships,* had an $r_{wg}$ value of .26, indicating lack of agreement.

Interrater agreement estimates for the construction manager categories were generally low, with importance and relevance ratings ranging from $r_{wg}$ = .14 to .48 for *budgeting*, .18 to .51 for *developing and implementing project site programs,* and .32 to .57 for *managing labor*. The lowest of these estimates is categorized as a lack of agreement (.14; *budgeting*), and the highest is moderate agreement (.57; *managing labor*) according to LeBreton and Senter's (2008) criteria.

Table 14

*Interrater Agreement for Behavioral Category Ratings of Relevance and Importance for the Job of a First-Line Foreman*

| | | Importance | | Relevance | |
|---|---|---|---|---|---|
| | | $r_{wg}$ | $r_{wg}$ | $r_{wg}$ | $r_{wg}$ |
| No. | Category | Skewed | Uniform | Skewed | Uniform |
| 31 | Prioritizing safety and well-being | 0.96 | 0.98 | 0.75 | 0.83 |
| 30 | Monitoring and maintaining project site safety | 0.90 | 0.93 | 0.72 | 0.81 |
| 11 | Taking responsibility | 0.85 | 0.90 | 0.78 | 0.86 |
| 15 | Leading by example and modeling | 0.84 | 0.89 | 0.69 | 0.79 |
| 14 | Communicating honestly | 0.82 | 0.88 | 0.69 | 0.79 |
| 23 | Giving direction about tasks and goals | 0.82 | 0.88 | 0.77 | 0.85 |
| 10 | Treating others with respect | 0.81 | 0.88 | 0.69 | 0.79 |
| 29 | Solving safety problems | 0.79 | 0.86 | 0.82 | 0.88 |
| 13 | Demonstrating effort and dedication | 0.77 | 0.85 | 0.66 | 0.77 |
| 1 | Solving problems | 0.74 | 0.83 | 0.55 | 0.70 |
| 19 | Motivating and encouraging involvement | 0.74 | 0.83 | 0.51 | 0.67 |
| 12 | Demonstrating work integrity | 0.74 | 0.82 | 0.54 | 0.69 |
| 2 | Managing interpersonal conflict | 0.73 | 0.82 | 0.59 | 0.72 |
| 6 | Promoting teamwork | 0.71 | 0.80 | 0.69 | 0.79 |
| 21 | Communicating roles and expectations | 0.71 | 0.80 | 0.69 | 0.79 |
| 25 | Giving recognition | 0.66 | 0.78 | 0.53 | 0.68 |
| 9 | Treating workers equally | 0.65 | 0.77 | 0.53 | 0.69 |
| 3 | Managing change and emergencies | 0.65 | 0.76 | 0.51 | 0.67 |
| 26 | Giving constructive feedback | 0.64 | 0.76 | 0.45 | 0.63 |
| 20 | Encouraging upward voice and feedback | 0.63 | 0.75 | 0.51 | 0.67 |
| 22 | Explaining task rationale | 0.63 | 0.75 | 0.44 | 0.63 |
| 32 | Being approachable and available | 0.63 | 0.75 | 0.66 | 0.77 |
| 24 | Monitoring performance | 0.61 | 0.74 | 0.49 | 0.66 |
| 4 | Regulating emotions | 0.59 | 0.72 | 0.50 | 0.66 |
| 28 | Providing material support | 0.57 | 0.71 | 0.52 | 0.68 |
| 33 | Helping out with tasks | 0.57 | 0.71 | 0.49 | 0.66 |
| 36 | Interacting with external parties | 0.57 | 0.71 | 0.44 | 0.63 |
| 8 | Communicating politely in language and tone | 0.56 | 0.71 | 0.38 | 0.58 |
| 35 | Innovating | 0.55 | 0.70 | 0.46 | 0.64 |
| 16 | Teaching | 0.53 | 0.69 | 0.47 | 0.65 |
| 17 | Mentoring | 0.52 | 0.68 | 0.45 | 0.63 |
| 7 | Sharing project information | 0.49 | 0.66 | 0.45 | 0.63 |
| 34 | Providing social support | 0.46 | 0.64 | 0.50 | 0.67 |
| 27 | Planning and organizing projects | 0.44 | 0.63 | 0.33 | 0.55 |
| 18 | Providing autonomy and empowerment | 0.34 | 0.56 | 0.51 | 0.67 |
| 5 | Building and maintaining relationships | 0.33 | 0.55 | 0.26 | 0.51 |
| | *Managing labor* | 0.32 | 0.54 | 0.37 | 0.57 |
| | *Developing and implementing project site programs* | 0.27 | 0.51 | 0.18 | 0.45 |

Table 14 continued.

| No. | Category | Importance $r_{wg}$ Skewed | Importance $r_{wg}$ Uniform | Relevance $r_{wg}$ Skewed | Relevance $r_{wg}$ Uniform |
|---|---|---|---|---|---|
| | *Budgeting* | 0.14 | 0.42 | 0.22 | 0.48 |
| | Mean[a] | 0.65 | 0.77 | 0.56 | 0.70 |
| | SD[a] | 0.15 | 0.10 | 0.13 | 0.09 |

*Note.* $N$ = 39. No. = Identifying number for a category. Construction manager categories are italicized. [a]Construction manager categories were not included in calculating the means and standard deviations.

Overall agreement for the taxonomy was $r_{wg(J)}$ = .87 (uniform) and $r_{wg(J)}$ = .79 (slightly skewed) for importance and $r_{wg(J)}$ = .83 (uniform) and $r_{wg(J)}$ = .72 (slightly skewed) for relevance. All of these values fall within the range of strong agreement indicated by LeBreton and Senter (2008). The agreement estimates for the construction manager categories were $r_{wg(J)}$ = .66 (uniform) and $r_{wg(J)}$ = .39 (slightly skewed) for importance and $r_{wg(J)}$ = .67 (uniform) and $r_{wg(J)}$ = .41 (slightly skewed) for relevance. These fall partly in the range of weak agreement (.31 to .50) and partly in the range of moderate agreement (.51 to .70; LeBreton & Senter, 2008). The difference between the taxonomy and construction manager categories when comparing across parallel measures (e.g., uniform importance to uniform importance agreement values) ranged from .16 (uniform relevance) to .40 (skewed importance). A difference of .20 represents one level of agreement (e.g., weak to moderate, moderate to strong; LeBreton & Senter, 2008), and the average difference of $r_{wg(J)}$ values between taxonomy and construction manager categories was $r_{wg(J)}$ = .27, reflecting that taxonomy categories were observed to have approximately one and a half levels of agreement more than construction manager categories. These results provide support for Hypothesis 3 in that 86.11% of categories rated for importance and 66.67% of categories rated for relevance exceeded an agreement level of $r_{wg \text{ skewed}}$ = .50.

**Mean levels.** Means and standard deviations for importance, frequency, and criticality for each taxonomic category and construction manager categories are presented in Table 15, ranked according to the criticality composite calculated for this study. All categories met the minimum desired mean of 3.00 out of 5.00 (Hughes & Prien, 1989) in support of Hypothesis 4. Safety-related categories received the top three highest ratings, where *prioritizing safety and well-being* received the highest rating (*M* = 4.89, *SD* = 0.28), followed by *monitoring and maintaining project site safety* (*M* = 4.79, *SD* = 0.42), and then *solving safety problems* (*M* = 4.77, *SD* = 0.47). Following these categories were *taking responsibility* (*M* = 4.71, *SD* = 0.45), *leading by example and modeling* (*M* = 4.65, *SD* = 0.47), and *giving direction about tasks and goals* (*M* = 4.62, *SD* = 0.47). The lowest ranked taxonomy categories were *building and maintaining relationships* (*M* = 3.68, *SD* = 0.94), *providing autonomy and empowerment* (*M* = 3.44, *SD* = 0.88), and *providing social support* (*M* = 3.38, *SD* = 0.81).

Rankings for importance and relevance were identical to those for criticality in 20 of the 39 measured categories. Of the 19 categories that differed in rankings, 15 categories had a difference of two ranks or fewer between the importance and relevance rank, suggesting minor differences between importance and relevance. Three categories had a difference of three ranks between importance and relevance. These categories were *motivating and encouraging involvement* (*importance M* = 4.38, *SD* = 0.59, *rank* = 13, *relevance M* = 4.23, *SD* = 0.81, *rank* = 16), *teaching* (*importance M* = 4.18, *SD* = 0.79, *rank* = 26, *relevance M* = 4.08, *SD* = 0.84, *rank* = 23), and *encouraging upward voice and feedback* (*importance M* = 4.15, *SD* = 0.71, *rank* = 27, *relevance M* = 4.08, *SD* = 0.81, *rank* = 24). *Solving problems* had a rank difference of four, where importance (*M* = 4.38, *SD* = 0.63, *rank* = 14) was ranked higher than relevance (*M* = 4.15, *SD* = 0.78, *rank* = 18).

Table 15

*Descriptive Statistics for Construction Leader Ratings of Taxonomy Categories*

| | | Criticality | | Importance | | Relevance | |
|---|---|---|---|---|---|---|---|
| No. | Category | *M* | *SD* | *M* | *SD* | *M* | *SD* |
| 31 | Prioritizing safety and well-being | 4.89 | 0.28 | 4.95 | 0.22 | 4.77 | 0.58 |
| 30 | Monitoring and maintaining project site safety | 4.79 | 0.42 | 4.85 | 0.37 | 4.69 | 0.61 |
| 29 | Solving safety problems | 4.77 | 0.47 | 4.77 | 0.54 | 4.77 | 0.48 |
| 11 | Taking responsibility | 4.71 | 0.45 | 4.74 | 0.44 | 4.64 | 0.54 |
| 15 | Leading by example and modeling | 4.65 | 0.47 | 4.69 | 0.47 | 4.56 | 0.64 |
| 23 | Giving direction about tasks and goals | 4.62 | 0.47 | 4.64 | 0.49 | 4.56 | 0.55 |
| 14 | Communicating honestly | 4.60 | 0.50 | 4.62 | 0.49 | 4.56 | 0.64 |
| 10 | Treating others with respect | 4.56 | 0.51 | 4.59 | 0.50 | 4.51 | 0.64 |
| 12 | Demonstrating work integrity | 4.54 | 0.63 | 4.59 | 0.59 | 4.44 | 0.79 |
| 13 | Demonstrating effort and dedication | 4.50 | 0.53 | 4.56 | 0.55 | 4.38 | 0.67 |
| 9 | Treating workers equally | 4.50 | 0.71 | 4.51 | 0.68 | 4.46 | 0.79 |
| 24 | Monitoring performance | 4.40 | 0.73 | 4.46 | 0.72 | 4.28 | 0.83 |
| 6 | Promoting teamwork | 4.33 | 0.60 | 4.36 | 0.63 | 4.28 | 0.65 |
| 19 | Motivating and encouraging involvement | 4.33 | 0.63 | 4.38 | 0.59 | 4.23 | 0.81 |
| 21 | Communicating roles and expectations | 4.33 | 0.60 | 4.36 | 0.63 | 4.28 | 0.65 |
| 1 | Solving problems | 4.31 | 0.61 | 4.38 | 0.59 | 4.15 | 0.78 |
| 32 | Being approachable and available | 4.31 | 0.66 | 4.33 | 0.70 | 4.26 | 0.68 |
| 28 | Providing material support | 4.26 | 0.75 | 4.28 | 0.76 | 4.21 | 0.80 |
| 2 | Managing interpersonal conflict | 4.24 | 0.63 | 4.28 | 0.60 | 4.15 | 0.74 |
| 3 | Managing change and emergencies | 4.24 | 0.70 | 4.28 | 0.69 | 4.15 | 0.81 |
| 4 | Regulating emotions | 4.19 | 0.70 | 4.23 | 0.74 | 4.10 | 0.82 |
| 8 | Communicating politely in language and tone | 4.17 | 0.79 | 4.21 | 0.77 | 4.10 | 0.91 |
| 17 | Mentoring | 4.15 | 0.78 | 4.21 | 0.80 | 4.05 | 0.86 |
| 26 | Giving constructive feedback | 4.15 | 0.69 | 4.21 | 0.70 | 4.05 | 0.86 |
| 16 | Teaching | 4.15 | 0.79 | 4.18 | 0.79 | 4.08 | 0.84 |
| 27 | Planning and organizing projects | 4.14 | 0.87 | 4.21 | 0.86 | 4.00 | 0.95 |
| 20 | Encouraging upward voice and feedback | 4.13 | 0.69 | 4.15 | 0.71 | 4.08 | 0.81 |
| 25 | Giving recognition | 4.10 | 0.68 | 4.15 | 0.67 | 4.00 | 0.79 |
| 7 | Sharing project information | 4.02 | 0.77 | 4.05 | 0.83 | 3.95 | 0.86 |
| 33 | Helping out with tasks | 4.02 | 0.75 | 4.05 | 0.76 | 3.95 | 0.83 |
| 35 | Innovating | 4.02 | 0.77 | 4.08 | 0.77 | 3.90 | 0.85 |
| 22 | Explaining task rationale | 3.95 | 0.71 | 4.03 | 0.71 | 3.79 | 0.86 |

Table 15 continued.

| No. | Category | Criticality *M* | Criticality *SD* | Importance *M* | Importance *SD* | Relevance *M* | Relevance *SD* |
|---|---|---|---|---|---|---|---|
| 36 | Interacting with external parties | 3.90 | 0.76 | 3.95 | 0.76 | 3.79 | 0.86 |
| | *Managing labor* | 3.85 | 0.92 | 3.92 | 0.96 | 3.69 | 0.92 |
| 5 | Building and maintaining relationships | 3.68 | 0.94 | 3.72 | 0.94 | 3.59 | 0.99 |
| | *Developing and implementing project site programs* | 3.63 | 1.00 | 3.72 | 1.07 | 3.46 | 1.02 |
| 18 | Providing autonomy and empowerment | 3.44 | 0.88 | 3.49 | 0.94 | 3.36 | 0.81 |
| 34 | Providing social support | 3.38 | 0.81 | 3.44 | 0.85 | 3.26 | 0.82 |
| | *Budgeting* | 3.14 | 0.98 | 3.23 | 0.99 | 2.95 | 1.05 |

*Note.* $N = 39$. No. = Identifying number for a category. Construction manager categories are italicized.

**Comparison of means.** Hypothesis 5 stated that effective construction leader behavior categories will be rated significantly higher in terms of importance and relevance than construction manager behavior categories. To compare taxonomy categories with construction manager categories, the data were arranged such that each row of the data file was a category and each cell contained the mean rating for importance, relevance, and criticality. Taxonomy categories were averaged and compared to construction manager categories using three paired-samples *t* tests. The first test found that importance ratings were significantly higher for taxonomy categories ($M = 4.30$, $SD = 0.35$) than for construction manager categories ($M = 3.62$, $SD = 0.62$), $t(38) = 7.99$, $p < .001$. Similarly, relevance ratings were significantly higher for taxonomy categories ($M = 4.18$, $SD = 0.48$) than construction manager categories ($M = 3.37$, $SD = 0.68$), $t(38) = 8.12$, $p < .001$. Finally, criticality ratings were also significantly higher for taxonomy categories ($M = 4.26$, $SD = 0.37$) than construction manager categories ($M = 3.54$, $SD = 0.61$), $t(38) = 8.35$, $p < .001$. These results demonstrate that as a whole, the taxonomy received significantly higher ratings from participants than construction manager categories, supporting Hypothesis 5. Figure 2 displays the magnitude of these differences.

It is important to note that there were three categories that were rated less critical on average than construction manager categories. *Managing labor* (*criticality M* = 3.85, *SD* = .92) was rated higher than the three lowest-ranked taxonomy categories (*building and maintaining relationships*, *providing autonomy and empowerment*, and *providing social support*) and the construction manager category *developing and implementing project site programs* (*criticality M* = 3.63, *SD* = 1.00) was rated higher than *providing autonomy and empowerment* (*criticality M* = 3.44, *SD* = 0.88) and *providing social support* (*criticality M* = 3.38, *SD* = 0.81). These construction manager categories were expected to receive ratings similar to *budgeting* (*criticality M* = 3.14, *SD* = .98), which received the lowest overall rating.

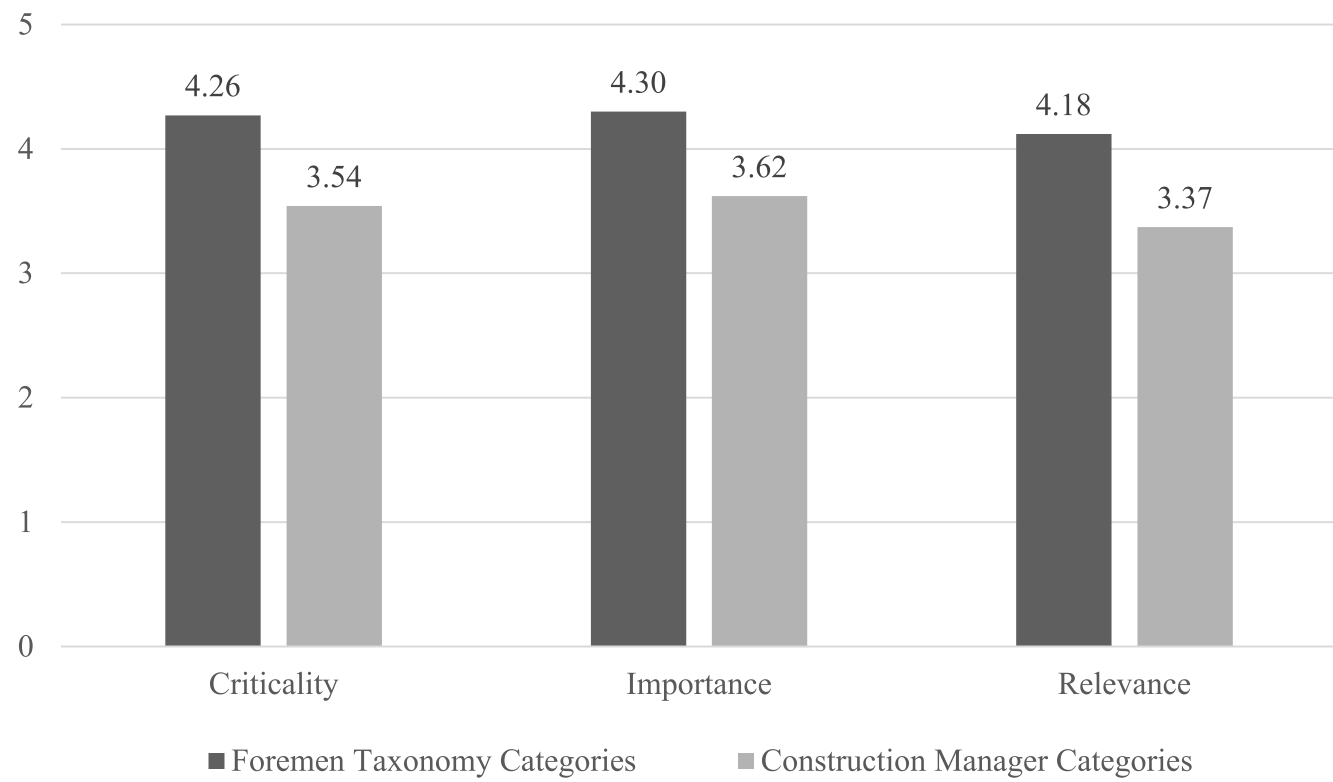


*Figure 2*. A comparison of means between taxonomy categories and construction manager categories.

**Supplementary analyses.** In order to identify potential relationships between taxonomy ratings and level of construction experience, zero-order correlations between industry tenure, years of experience as a foreman, years of experience supervising foremen, job tenure, and criticality scores were examined (see Table 16). Eleven of 144 correlation coefficients between experience indicators and taxonomy categories were significant at $p < .05$. Of those 11 significant correlations, 7 were between years of experience as a foreman and criticality ratings of taxonomy categories. These categories were *managing interpersonal conflict, treating others with respect, teaching, providing autonomy and empowerment, explaining task rationale, planning and organizing projects,* and *interacting with external parties*. All significant correlations were positive, with the exception of the relationship between job tenure and *promoting teamwork*, which was negative. A Type I error rate of 5% would suggest 7.2 out of 144 correlations would be significant purely by chance. A Bonferroni correction on 144 correlations at a .05 alpha level requires a *p* value of less than .00003472 in order to be considered significant, and none of the correlations were below this value. However, an *N* of 39 is only sufficient to detect an effect of .316 or greater (Faul, Erdfelder. Buchner, & Lang, 2009). As such, these analyses were underpowered to detect smaller relationships, however the infrequency of significant correlations appears to suggest no consistent relationship between indicators of experience and taxonomy ratings.

Table 16

*Correlations between Experience Indicators and Selected Taxonomy Categories*

| | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| 1. Years in Construction Industry | | | | |
| 2. Years as a Foreman | | | | |
| 3. Years supervising foremen | | | | |
| 4. Job tenure | | | | |
| 5. Managing interpersonal conflict | .297 | .408** | .303 | .150 |
| 6. Building and maintaining relationships | .010 | .214 | .336* | .198 |
| 7. Promoting teamwork | -.219 | -.230 | .022 | -.348* |
| 8. Treating others with respect | .082 | .383* | .203 | .067 |
| 9. Teaching | .163 | .353* | .154 | .244 |
| 10. Providing autonomy and empowerment | -.136 | .326* | .186 | .145 |
| 11. Explaining task rationale | .329* | .439** | .178 | .206 |
| 12. Planning and organizing projects | -.021 | .476** | .253 | .168 |
| 13. Helping out with tasks | .317* | .181 | -.011 | .198 |
| 14. Interacting with external parties | .166 | .442** | .148 | .170 |

*Note.* $N = 39$.
*$p < .05$. **$p < .01$. ***$p < .001$.

# CHAPTER 5

# DISCUSSION

Construction is a major industry that accounts for an average of 3.3% of the United States' GDP (U.S. Bureau of Economic Analysis, 2013) yet it has incurred significant financial and human costs from preventable accidents and injuries (Everett & Frank, 1996; Waehrer et al., 2007) and suboptimal work practices (Ringen et al., 1995). Leadership is a resource that can improve task performance (Avolio et al., 2009) and safety performance (Christian et al., 2009) but the construction industry is facing a shortage of effective leaders, which could be contributing to inefficient practices and high accident and injury rates (Rogers, 2007).

The first-line foreman is at the forefront of this leadership shortage (Rogers, 2007), as the position carries with it unique demands. The hazardous and demanding nature of the work (MacKenzie, 2008) combined with the organizational instability inherent in rotating from one project site to another (Eccles, 1981) requires unique construction leader behaviors (CLBs) by first-line foremen in order to maximize positive outcomes in the face of organizational change (Gilmore et al., 1997).

In light of the unique challenges associated with leadership in the construction industry, the present study aimed to elucidate the CLBs that make a first-line foreman effective. This study takes the first step in alleviating the leadership struggles of the construction industry by identifying the CLBs required of foremen to be effective leaders. Thus, the purpose of the present study was to develop and validate a taxonomy of effective first-line foreman CLBs which was accomplished in two phases using qualitative and quantitative methods.

**Phase 1 – Grounded Theory Analysis**

Phase 1 aimed to answer two research questions: (1) what leader behaviors are considered effective in the construction industry? and (2) how can effective leader behaviors be organized into meaningful categories and dimensions? In order to answer these questions, three grounded theory analysts extracted construction leader behaviors (CLBs) from archival focus group data (Hoffmeister et al., 2011) according to the operational definition "an observable action that influences another toward a goal." Discussion and consensus resulted in a final set of 375 CLBs and a grounded theory analysis was conducted (Glaser & Strauss, 1965; Corbin & Strauss, 2008). The outcome of this analysis was an initial taxonomy containing 9 CLB dimensions, 34 CLB categories, and 375 CLBs (Table 2).

Following the development of the initial taxonomy, 126 CLBs were extracted from 11 construction leadership articles (Appendix B) and categorized into the initial taxonomy. The purpose of this comparison was to bolster the taxonomy with the efforts of previous researchers and highlight the presence of any gaps in the taxonomy. Two new categories (*interacting with external parties* and *innovating*) and one new dimension (*Innovating*) emerged from this analysis. The outcome of Phase 1 was a three-level taxonomy including 375 CLBs at the most specific level, 36 categories of CLBs at the next level, and 10 dimensions of CLB categories at the most general level.

**Phase 2 – Validation**

**Study 1.** The purpose of Phase 2 was to provide evidence for internal and external validity of the CLB taxonomy using two studies. Prior to conducting Study 1, the 375 CLBs from Phase 1 were converted from direct quotes by focus group participants into 311 CLB task statements by the first and third analysts. The aim of Study 1 was to gather evidence of internal validity by enlisting the help of five leadership SMEs (i.e., coders) who categorized 311 CLBs into 36 categories and 36 CLB categories into 10 CLB dimensions based on the taxonomy from Phase 1. This task served as a test of the grounded theory analysts' rationale for the taxonomy's structure via assessment of agreement statistics which reflected the extent to which coders' categorizations agreed with those of the grounded theory analysts.

Support was found for Hypothesis 1, which stated that coders would demonstrate agreement with each other and with grounded theory analysts in their classifications of 311 CLBs into 36 categories. Krippendorff's alpha for this stage was .63. Following initial calculation of agreement statistics, CLBs with low agreement were examined and 18 CLBs deemed "low-quality" were removed on the basis that they were vague or double-barreled, which was an artifact of converting participant focus group statements into task statements. After removing low-quality CLBs, the Krippendorff's alpha for the first stage of coding was .67, which meets the minimum criteria of .667 recommended by Krippendorff (2004). Support was also found for Hypothesis 2, which stated that coders would demonstrate agreement with each other and with grounded theory analysts in their classifications of 36 effective CLB categories into 10 dimensions. The Krippendorff's alpha value at this stage was .80, indicating a high level of agreement (Krippendorff, 2004).

Task difficulty can attenuate the Krippendorff's alpha statistic (Krippendorff, 2011) and this may have been the reason for the low Krippendorff's alpha observed in the first stage of coding. Supporting this explanation are statements from coders who indicated that coding 311 CLBs into 36 categories was a challenging task. In comparison, the second stage required coding 36 categories into 10 dimensions, a substantially easier task, and subsequently the Krippendorff's alpha value was higher (.80) than in the first stage. Consequently, percentage agreement can provide a secondary estimate of agreement.

While percentage agreement is not typically recommended due to the potential for inflation via chance agreement, the probability of chance agreement between any two coders for a single CLB was 1 in 36 (2.78%). Whereas Krippendorff's alpha may be underestimating agreement for the first stage of coding due to task difficulty, percentage agreement is not likely to be inflated by chance agreement. In the first stage, 311 CLBs were coded by 5 coders, resulting in 1,555 coded CLBs. Of these 1,555 coded CLBs, coders agreed with the grounded theory analysts 1,122 times (75.09%) and with the modal code 1,215 times (78.14%). In the second stage, coders agreed both with the original codes and modal codes 164 out of 180 times (91.11%). Given that the likelihood of chance agreement was 2.78%, agreement statistics of 75.09% and 80.89% appear to suggest substantial agreement that is not likely to be inflated by chance. Interpretation of these percentage agreement values suggest that coders agreed with the grounded theory analysts' original codes at a high rate in both phases and agreed with each other at an even higher rate.

Despite the high agreement, there were instances where coders systematically disagreed with the analysts' original codes. Such systematic differences suggest areas for potential re-categorization of CLBs. For example, the CLB "seeks multiple perspectives when solving problems" was originally coded as *solving problems*, but four out of five coders categorized it into *encouraging upward voice and feedback*. More pressing, however, is the potential need to merge categories as a result of coders' consistent disagreements with original codes. For example, the CLB "Informs workers of project site hazards" was originally coded into *solving safety problems* but was unanimously coded as *monitoring and maintaining project site safety* by coders. Several unanimous disagreements were coded into conceptually similar categories which suggests that some of the distinctions between categories made during the grounded theory analysis may be too subtle to require a new category and should be merged. However, no categories were merged at this stage because (1) agreement statistics demonstrated adequate support for the structure of the taxonomy, (2) narrowly defined categories allowed for more specificity in Study 2, and (3) factor structure is beyond the scope of the present study.

**Study 2.** This study sought to obtain evidence for the external validity of the CLB categories by recruiting 39 construction leaders who, as subject matter experts (SMEs), provided relevance and importance ratings of the 36 CLB categories of the taxonomy. In addition, SMEs provided ratings for three control categories derived from a list of construction manager behaviors identified in O*NET (2015a). SMEs were from a variety of trades, which enhances the generalizability of the CLB taxonomy to the construction industry as a whole (Cigularov, Lancaster, Chen, Gittleman, & Haile, 2013) beyond the plumbers, pipefitters, superintendents, and safety directors originally sampled in the focus groups in Phase 1.

Support was found for Hypothesis 3, which stated that participants would have high agreement with regards to their ratings of importance and relevance of effective CLB categories. Interrater agreement for the taxonomy as a whole was adequate, indicating that the taxonomy categories are indeed representative of effective CLBs. Interrater agreement estimates ($r_{wg}$; James et al., 1984) ranged from weak to very strong (.31 to .50 and .91 to 1.00, respectively; LeBreton & Senter, 2008) and the majority of categories (73.6%) achieved at least moderate agreement (.51 to .70).

The four categories with the strongest agreement were *prioritizing safety and well-being*, *monitoring and maintaining project site safety*, *taking responsibility*, and *leading by example and* *modeling*. These categories fall into the dimensions *Promoting Safety and Well-being* and *Demonstrating Effort and Integrity*, indicating that criticality of safety- and integrity-related CLBs were widely agreed-upon by SMEs. The high level of agreement further suggests that there is little variability in perceptions regarding the criticality of safety-related and integrity-related CLBs for effective foremen. This criticality likely stems from SMEs' understanding of the importance of safety leadership, which has been demonstrated to have positive relationships with safety performance and negative relationships with accidents and injuries both across industries (Christian et al., 2009) and in construction (Hoffmeister et al., 2014).

Conversely, the four categories with the weakest agreement were *building and maintaining relationships, providing autonomy and empowerment, planning and organizing projects,* and *providing social support*. Three out of these four categories are person-oriented, suggesting that there is disagreement regarding the criticality of person-oriented CLBs for being a successful foreman. This finding is inconsistent with statements from the focus group participants who emphasized the importance of a leader who demonstrates care and consideration as evidenced by the emergence of person-oriented categories such as *being approachable and available, communicating politely in language and tone,* and *giving recognition* in the grounded theory analysis.

The construction manager categories had weak agreement (.31 to .50) at best and, in general, had weaker agreement than the CLB categories. There were large differences in agreement for relevance and importance ratings between the CLB category with the highest agreement, *prioritizing safety and well-being*, and the construction manager category with the lowest agreement, *budgeting.* The agreement estimates for the CLB category *prioritizing safety and well-being* were $r_{wg\ \mathrm{Skewed}} = .82$ higher than *budgeting* for importance and $r_{wg\ \mathrm{Skewed}} = .53$

higher than *budgeting* for relevance. However, the differences between the CLB category with the lowest agreement (*building and maintaining relationships*) and the construction manager category with the highest agreement (*managing labor*) were much smaller, only $r_{wg \text{ Skewed}} = .01$ for importance and $r_{wg \text{ Skewed}} = .11$ for relevance. Further, *managing labor* actually obtained higher agreement than *building and maintaining relationships*.

The relatively high level of agreement for *managing labor* may be due to the category label, which may have been so broad that it was perceived as relevant despite the unrelated operational definition "determines labor requirements for dispatching workers to construction sites." *Managing labor* stands in contrast to the other construction manager categories *budgeting* and *implementing project site programs*, which are both named in a way that clearly suggests they are not critical to the foreman role. In general, however, the manipulation was successful as foremen CLBs were often differentiated from construction manager CLBs with regards to the ratings provided by SMEs. This high level of agreement suggests that mean relevance and importance ratings were fairly stable across the sample.

Support was found for Hypothesis 4, which stated that participants would rate each CLB category as at least moderately important and relevant to the foreman role. Every CLB category averaged above a three on a five-point scale for both relevance and importance. This result suggests that the CLB categories that emerged in the taxonomy are indeed relevant and important to the role of an effective first-line foreman and provides initial evidence for the external validity of the taxonomy.

The three categories receiving the highest criticality scores were safety-related (*prioritizing safety and well-being*, *monitoring and maintaining project site safety*, and *solving safety problems*). Considering the construction industry's safety record (U.S. Bureau of Labor

Statistics, 2015a, 2015b), it is unsurprising that safety-related CLBs are a top priority for SMEs. Prior research has supported the criticality of safety-related CLBs, particularly idealized influence behaviors and active management by exception (Hoffmeister et al., 2014) as well as safety-specific leader justice (Kaufman et al., 2014). The CLB categories *monitoring and maintaining project site safety* and *solving safety problems* both appear to fall under active management by exception, whereas *prioritizing safety and well-being* reflects individualized consideration. Foremen who prioritize safety and well-being demonstrate care for their workers and safety-related CLBs may be particularly effective in the face of a weak safety climate when pressure to increase production comes at the expense of safety (Clarke, 2013).

Following safety-related categories were those that pertained to acting as a role model, which included *taking responsibility* and *leading by example and modeling*. These categories align well with the idealized influence sub-dimension of transformational leadership, which involves influencing followers via role modeling behaviors (Bass, 1985). In the construction literature, Skipper and Bell (2006) found that the role modeling behaviors differentiated between bottom and top performing construction project managers. Similar CLBs were also linked to project performance (Adams, 2007; Dulaimi et al., 2005) and innovation (Dainty et al., 2004). Considering the evidence for the relationship of role modeling CLBs with performance, it is understandable that they would be the second most critical CLBs after safety.

The subsequent cluster contained categories relating to effective communication, including *giving direction about tasks and goals*, *communicating honestly*, and *treating others with respect*. The first of these, *giving direction about tasks and goals*, is reflective of directive behaviors inherent in transactional leadership (Bass, 1985). The CLB category *communicating honestly* reflects ethical leadership (Brown, Treviño, & Harrison, 2005) and *treating others with* *respect* is conceptually similar to individualized consideration (Bass, 1985). With the exception of *communicating honestly*, these categories of CLBs were identified as factors critical to project success by Nauom et al. (2004) and as best practices by Koskenvesa and Sahlstedt (2012). *Communicating honestly* did not appear in any of the construction leadership research used as a supplement in Phase 1, and as such could represent a unique contribution of this taxonomy. Focus group participants provided statements such as “tells workers the real story” and “does not hide problems from workers,” which indicate transparency in communication. Research on how transparent communication can be used effectively is absent in the construction literature, but SMEs appeared to agree with focus group participants and provided high criticality ratings to *communicating honestly*.

Ranked after communications-related categories were *demonstrating work integrity* and *demonstrating effort and dedication*, which both reflect the type of role-modeling behaviors that characterize the idealized behaviors subdimension of transformational leadership (Bass, 1985). Similar to findings in larger leadership literature regarding the relationship between idealized influence and group performance (Judge & Piccolo, 2004), these CLB categories were also positively related to effective performance in the construction literature e.g., Adams, 2007; Dulaimi et al., 2005; Skipper & Bell, 2006).

Task-oriented categories are found in the mid-ranks, including *monitoring performance*, *solving problems*, and *providing material support*, all of which reflect transactional leader behaviors (Bass, 1985). As with the preceding CLB categories, these categories emerged in the construction literature when characterizing effective construction leaders (e.g., Enshassi & Burgess, 1991). Task-oriented CLBs such as these appear to reflect the role of the foreman as a manager, “doing things right,” rather than a leader who “does the right thing” (Bennis, 2009).

These categories were ranked in the middle relative to other categories which suggests that effective management may be a necessary but not sufficient condition for effective foreman leadership.

Next were person-oriented categories such as *motivating and encouraging involvement*, *promoting teamwork*, and *managing interpersonal conflict*. The CLB categories *motivating and encouraging involvement* and *promoting teamwork* involve motivational behaviors and are therefore comparable to the inspirational motivation subdimension of transformational leadership (Bass, 1985). The latter, *managing interpersonal conflict,* could be reflective of passive management-by-exception (Bass, 1985), since a problem needs to have escalated to the point of interpersonal conflict before the foreman intervenes. It is unclear why these categories were rated as less critical than the preceding categories is unclear since they appear in the construction leadership literature (e.g., Dulaimi et al., 2005). It is possible that while they may be relevant to higher level leadership positions (Dulaimi & Langford, 1999), they may not be as critical to the foreman role.

Rated less critical than the preceding categories were *managing change and emergencies*, *regulating emotions*, *communicating politely in language and tone*, *mentoring*, *giving constructive feedback*, and *teaching*. With regards to the full-range leadership model, these categories nearly span the breadth of it. *Managing change and emergencies* can be considered passive management-by-exception, *regulating emotions* is a role modeling behavior befitting idealized influence, *communicating politely in language and tone* could be conceptualized as either individualized consideration or idealized influence depending on the perspective being taken (i.e., that of a follower interacting with the leader versus one observing an interaction), and *teaching* and *mentoring* are individualized consideration. The last one, *giving construction* *feedback* can be considered a facet of transactional leadership. *Teaching, mentoring,* and *giving constructive feedback* were all represented in the construction leadership literature (Adams, 2007; Dulaimi & Langford, 1999) yet were ranked relatively low in criticality. This is a surprising result and may indicate that SMEs perceived the role of the foreman to be one of a manager rather than a transformational leader. The perspective of the foreman as a manager runs contrast to prior construction leadership research that has demonstrated the positive effects of transformational leadership on safety climate, safety behaviors, and injuries (Hoffmeister et al., 2014). As such, this could represent a gap between research and practice where the positive impacts of transformational leadership have not been communicated to practitioners.

Next, the categories *encouraging upward voice and feedback*, *giving recognition,* and *innovating* were ranked less critical than all preceding categories. *Encouraging upward voice and feedback* has some degree of fit with the intellectual stimulation subdimension of transformational leadership since asking followers for their opinions requires cognition on the part of the followers, but there is also a facet of receptiveness to the followers' feedback (e.g., considers workers' feedback and opinions) inherent in the category that does not clearly align with any of the dimensions of the full-range leadership model. It was surprising to see this category ranked below the others since *encouraging upward voice and feedback* is readily represented in multiple construction leadership studies (Adams, 2007; Dulaimi et al., 2005; Dulaimi & Langford, 1999; Eshassi & Burgess, 1991; Traibherm, 2003). It is worth reiterating that every CLB category received an average criticality rating above three out of five, suggesting that every category is at least moderately critical. This may be why these CLB categories are ranked lower than the other CLB categories. They are critical, but less critical than safety, role modeling, and communicating.

The category *giving recognition* reflects the contingent reward subdimension of transactional leadership, where the reward is provided in terms of social support and status. *Giving recognition* did not emerge in any of the construction leadership studies, so this is an instance where focus group participants and SMEs may have been at odds with one another. *Giving recognition* emerged in several focus groups, so there is no clear explanation for why it was ranked so low in criticality. Last, the category *innovating* reflects intellectual stimulation when the CLBs are directed toward workers (e.g., “encourages alternative approaches to completing job tasks”) and reflects idealized influence when the workers are not the target (e.g., “finds or creates new opportunities to improve work processes”). *Innovating* has been studied frequently in the construction literature, however it is generally not advised to innovate in a high-risk context due to increased risk of accident or injury (Bossink, 2004). Therefore, its relatively low criticality rating may be due to the foreman as a referent rather than the project manager whose innovation behaviors are less likely to be focused on workers’ tasks (Skipper & Bell, 2006).

Finally, the categories rated least critical relative to other categories were *building and maintaining relationships*, *providing autonomy and empowerment*, and *providing social support*. Person-oriented behaviors like *building and maintaining relationships* and *providing social support* align with individualized consideration in transformational leadership. The relationships and social support component has been shown to be important both in general leadership research (Judge & Piccolo, 2004) and in construction leadership literature (e.g., Traibherm, 2003). *Providing autonomy and empowerment* is akin to intellectual stimulation whereby foremen give workers the freedom to think for themselves. *Providing autonomy and empowerment* may have received lower criticality ratings for the same reason *innovation* was ranked relatively low, which is that autonomy may be unsafe in a high-risk context. Some example CLBs from this category, however, are "involves project team in decision making," "does not micromanage," and "demonstrates trust in the crew by allowing them to complete tasks without supervision." The first two example CLBs are relatively benign in terms of their potential to effect a negative outcome, but the last CLB describes lack of supervision, which could be risky. If SMEs conceptualized the category in a more laissez-faire manner, the risky implications of autonomy may have caused divergence in ratings and subsequent low ratings and agreement estimates.

Overall, SME ratings were consistent with what has been identified as critical in both the construction and the larger leadership literatures. These results demonstrate that the order of priority for CLBs are: (1) safety-related, (2) role-modeling, (3) communicating, (4) task-oriented and (5) person-oriented. While safety prioritization may be an explanation for why it is ranked the highest, it is not clear why role modeling is ranked more highly than person-oriented categories. Previous research has identified modeling as the most important (Adams, 2007), however its criticality has not been examined in relation to other behaviors. The present study therefore offers the first foray into the relative criticality of foremen CLBs.

One final point in regards to the CLB category rankings is about the relationship between mean ratings and agreement statistics. When examining Table 14 (CLB categories ranked by agreement) in comparison to Table 15 (CLB categories ranked by criticality), the categories at the bottom of Table 14 also tended to be at the bottom of Table 15 (e.g., *providing social support*). Having low agreement estimates are indicative of high standard deviations, which is in turn indicative of variability in category ratings. Thus, the rankings of categories with low agreement should be interpreted with caution and the reasons for disagreement are a subject for future research, especially since a shift in thinking about the role of the foreman as a leader rather than a manager could be occurring and such a shift would yield divergent agreement estimates.

Generational differences were examined in supplementary analyses as a potential explanation for the lack of agreement regarding the criticality of person-oriented CLBs. Older construction leadership literature characterizes the effective foreman using task-oriented descriptors such as knowledgeable, skilled, and productive (Borcherding, 1977) whereas newer construction leadership literature emphasizes the role of person-oriented behaviors (Traibherm, 2003). If the SMEs in Study 2 were foremen during a time when the effective foremen was characterized as a manager (industry tenure $M = 25.36$ years), these beliefs may have been carried into the present day which would have resulted in lower ratings for person-oriented CLB categories. The focus group participants, conversely, had a shorter average industry tenure ($M = 18.31$) and may have worked for person-oriented foremen resulting in person-oriented CLBs emerging in the focus group scripts. Using experience indicators (i.e., industry tenure, job tenure, years as a foreman, years supervising foremen) as a proxy for task-oriented versus person-oriented characterization of foremen, zero-order correlations were examined with criticality scores for each of the 36 CLB categories. The supplementary analyses resulted in only one significant negative relationship between an experience indicator (job tenure) and a criticality score (promoting teamwork). More frequently occurring were significant positive relationships between experience indicators and criticality ratings, although Bonferroni corrections rendered these correlations nonsignificant. Considering the analyses were underpowered, it is possible that more experience is in fact positively related to criticality ratings of person-oriented CLBs.

Hypothesis 5 stated that effective CLB categories will be rated significantly higher in terms of importance and relevance than construction manager behavior categories. This manipulation was included to strengthen the validity of inferences by examining the extent to which CLB categories were specific to first-line foremen and whether construction manager behaviors were interchangeable. The results indicated that construction manager categories were rated significantly lower on average than taxonomy categories. Thus, Hypothesis 5 was supported and evidence was obtained in support of the specificity of the taxonomy categories to the role of the first-line foreman.

**Comparison to Previous Leader Behavior Taxonomies**

The CLB taxonomy was compared to two extant general leader behavior taxonomies (Fleishman et al., 1991; Yukl et al., 2002, 2012) as displayed in Table 17. Overall convergence was excellent and the CLB taxonomy contained one unique dimension not found in Fleishman et al.'s (1991) taxonomy. In comparison to Fleishman's taxonomy, the CLB taxonomy dimension *Managing Personnel Resources* corresponded to eight CLB taxonomy dimensions (e.g., *Building and Promoting Relations*). Within Fleishman's *Managing Material Resources* dimension, the CLB taxonomy dimension *Planning and Organizing* fit cleanly. The dimension *Innovation* loosely converges with *Information Search and Structuring,* while *Adapting and Resolving* and *Planning and Organizing* align well with Fleishman's *Information Use in Problem Solving*. The unique contribution of the CLB taxonomy dimension was *Demonstrating Effort and Integrity*, which did not correspond with any of Fleishman's dimensions. Additionally, the CLB taxonomy dimension *Managing Performance* fit in two of Fleishman's dimensions (*Managing Personnel Resources* and *Information Use in Problem Solving*).

When comparing the CLB taxonomy to Yukl et al.'s (2002; 2012) taxonomy, the majority of fit lies within the *Task-oriented* and *Relations-oriented* dimensions. These dimensions fit six (e.g., *Adapting and Resolving*) and five (e.g., *Building and Promoting Relations*) CLB taxonomy dimensions, respectively. Yukl's *Change-oriented* dimension aligned with the CLB taxonomy's *Inspiring and Empowering* and *Innovating* dimensions and the Yukl's *External* dimension matched with the CLB taxonomy's dimension *Building and Promoting Relations.* Additionally, five CLB taxonomy dimensions spanned multiple Yukl dimensions (e.g., *Inspiring and Empowering* fit in both *Relations-oriented* and *Change-oriented* dimensions).

Table 17

*Convergence of Construction Leader Behavior Taxonomy Dimensions with Previous Taxonomies of Effective Leader Behaviors*

| **Fleishman et al. (1991) Taxonomy**<br>CLB Taxonomy | **Yukl et al. (2002; 2012) Taxonomy**<br>CLB Taxonomy |
|---|---|
| **Managing Personnel Resources** | **Task-oriented** |
| Adapting and Resolving | Adapting and Resolving |
| Building and Promoting Relations | Demonstrating Effort and Integrity |
| Developing Followers | Innovating |
| Inspiring and Empowering | Managing Performance |
| Providing Support | Planning and Organizing |
| Managing Performance | Promoting Safety and Well-being |
| Prioritizing Safety and Well-being | |
| | **Relations-oriented** |
| **Managing Material Resources** | Building and Promoting Relations |
| Planning and Organizing | Developing Followers |
| | Inspiring and Empowering |
| **Information Search and Structuring** | Managing Performance |
| Innovating | Providing Support |
| | |
| **Information Use in Problem Solving** | **Change-oriented** |
| Adapting and Resolving | Inspiring and Empowering |
| Managing Performance | Innovating |
| Promoting Safety and Well-being | |
| | **External** |
| **No convergence** | Building and Promoting Relations |
| Demonstrating Effort and Integrity | |

Examining the distribution of CLB taxonomy dimensions shows that a large number of dimensions converged with Fleishman's *Managing Personnel Resources* and Yukl's *Task-oriented* and *Person-oriented* dimensions. Only one CLB taxonomy dimension matched Fleishman's *Information Search and Structuring* dimension, suggesting that leader behaviors contained within the *Information Search and Structuring* are less relevant to the foreman role based on the findings reported herein. Conversely, a disproportionate number of CLB taxonomy dimensions were subsumed under Fleishman's *Managing Personnel Resources*, which suggests that person-oriented CLBs are a crucial part of effective foreman leadership.

Similarly, the CLB taxonomy's fit with Yukl et al.'s (2002; 2012) taxonomy was largely within the *Task-oriented* and *Person-oriented* dimensions, where all 11 CLB taxonomy dimensions were able to be classified. The results of this comparison lend support to the well-established two-factor model of leadership that includes *consideration* (i.e., person-oriented) and *initiating structure* (i.e., task-oriented; Stogdill & Coons, 1957). Considering that Fleishman's and Yukl's taxonomies are intended to generalize to the entire population of leaders, the taxonomies were compared at the more granular category level in order to better distinguish similarities and differences that arise from examining leadership in the specific construction context. Table 18 contains a category-level comparison between the CLB taxonomy and the taxonomies developed by Fleishman et al. (1991) and Yukl et al. (2012).

Table 18

*Convergence of Construction Leader Behavior Taxonomy Categories with Previous Taxonomies of Effective Leader Behaviors*

| **Fleishman et al. (1991) Taxonomy Category**<br>CLB Taxonomy Category | **Yukl et al. (2002; 2012) Taxonomy Category**<br>CLB Taxonomy Category |
|---|---|
| **Identifying Needs and Requirements** | **Clarifying** |
| Solving problems | Communicating roles and expectations |
| Managing crises and emergencies | Explaining task rationale |
| Solving safety problems | Giving direction about tasks and goals |
| | Planning and organizing projects |
| **Planning and Coordinating** | |
| Planning and organizing projects | **Planning** |
| | Planning and organizing projects |
| **Communicating Information** | |
| Regulating emotions | **Monitoring operations** |
| Sharing project information | Monitoring performance |
| Communicating politely in language and tone | Monitoring and maintaining project site safety |
| Treating others with respect | |
| Communicating honestly | |
| Communicating roles and expectations | **Problem solving** |
| | Solving problems |
| **Obtaining and Allocating Personnel Resources** | Managing interpersonal conflict |
| | Managing crises and emergencies |
| No convergence | Solving safety problems |
| **Developing Personnel Resources** | **Supporting** |
| Teaching | Building and maintaining relationships |
| Mentoring | Communicating politely in language and tone |
| Explaining task rationale | |
| Giving constructive feedback | Treating others with respect |
| | Being approachable and available |
| **Motivating Personnel Resources** | Providing social support |
| Building and maintaining relationships | |
| Promoting teamwork | **Developing** |
| Motivating and encouraging involvement | Teaching |
| Being approachable and available | Mentoring |
| Providing social support | Giving constructive feedback |
| **Utilizing and Monitoring Personnel Resources** | **Recognizing** |
| | Giving recognition |
| Giving direction about tasks and goals | |
| Monitoring performance | **Empowering** |
| Giving recognition | Providing autonomy and empowerment |

Table 18 continued.

| **Fleishman et al. (1991) Taxonomy Category**<br>CLB Taxonomy Category | **Yukl et al. (2002; 2012) Taxonomy Category**<br>CLB Taxonomy Category |
|---|---|
| **Obtaining and Allocating Material Resources** | **Advocating change** |
| | Innovating |
| Providing material support | |
| | **Envisioning change** |
| **Utilizing and Monitoring Material Resources** | Innovating |
| Providing material support | |
| Solving problems | **Encouraging innovation** |
| Solving safety problems | Innovating |
| Planning and organizing projects | |
| | **Facilitating collective learning** |
| **Acquiring Information** | Promoting teamwork |
| Planning and organizing projects | |
| Monitoring and maintaining project site safety | **Networking** |
| | Interacting with external parties |
| **Organizing and Evaluating Information** | |
| No convergence | **External monitoring** |
| | No convergence |
| **Feedback and Control** | |
| Teaching | **Representing** |
| Giving direction about tasks and goals | Interacting with external parties |
| **No Convergence** | **No Convergence** |
| Managing interpersonal conflict | Regulating emotions |
| Interacting with external parties | Sharing project information |
| Treating employees equally | Treating employees equally |
| Taking responsibility | Taking responsibility |
| Demonstrating work integrity | Demonstrating work integrity |
| Demonstrating effort and dedication | Demonstrating effort and dedication |
| Leading by example and modeling | Communicating honestly |
| Prioritizing safety and well-being | Leading by example and modeling |
| Providing autonomy and empowerment | Motivating and encouraging involvement |
| Encouraging upward voice and feedback | Encouraging upward voice and feedback |
| Helping out with tasks | Providing material support |
| Innovating | Prioritizing safety and well-being |
| | Helping out with tasks |

In comparison to Fleishman's taxonomy, 24 CLB taxonomy categories matched and 12 CLB categories did not adequately fit. The CLB taxonomy contains unique categories emphasizing integrity (e.g., *demonstrating effort and dedication*), task support (e.g., *helping out with tasks*), modeling (e.g., *leading by example and modeling*), justice (e.g., *treating workers equally*), empowerment (e.g., encouraging upward voice and feedback), *prioritizing safety and well-being*, *innovating*, and *interacting with external parties*.

For the category-level comparison, Yukl's 2012 model was selected over the 2002 model on the basis that it contained clearer, more concise category definitions. The resulting analyses identified 13 unique CLB taxonomy categories relative to Yukl's categories. The 13 unique CLB taxonomy categories related to role modeling (e.g., *leading by example and modeling*), ethical behavior (e.g., *demonstrating work integrity*), justice (e.g., *treating employees equally*), encouraging communication (e.g., *encouraging upward voice and feedback*), motivating (e.g., *motivating and encouraging involvement*), and *prioritizing safety and well-being*. The CLB category *helping out with tasks* was also unique to the CLB taxonomy since Yukl's *support* category defines support in terms of interpersonal support rather than task support.

One difference of note between the 2002 and 2012 versions of Yukl's taxonomy was the presence of a category labeled *consulting* in the 2002 version. The CLB category *encouraging upward voice and feedback* would have been categorized under *consulting*, however this category was moved to *empowering* in the 2012 version of the taxonomy. Consulting with employees and empowering employees emerged as conceptually different during the grounded theory analysis, as evidenced by the distinct categories *providing autonomy and empowerment* and *encouraging upward voice and feedback*. As such, the latter category demonstrates a different type of behavior than Yukl's *empowering* category.

Just as the CLB taxonomy contained unique elements not found in extant taxonomies, two categories in Fleishman and Yukl's models did not converge with the CLB taxonomy. In Fleishman et al.'s (1991) taxonomy, *obtaining and allocating personnel resources* did not converge with any category in the CLB taxonomy. Similarly, the category *external monitoring* in Yukl's (2012) did not converge. One explanation for this lack of convergence is the CLB taxonomy's focus on first-line foremen. As a first-line supervisor, obtaining and allocating personnel and monitoring fluctuations in the external business environment are not tasks that are commonly assigned to foremen (O*NET, 2015b).

The preceding comparison resulted in moderate convergence between the taxonomies, yet the categorical differences highlight the uniqueness of the CLB taxonomy in the construction industry context. Previous research into effective leadership has led to the consistent emergence of the *consideration* (i.e., person-oriented) and *initiating structure* (i.e., task-oriented) dimensions of leader behaviors first identified in the Ohio State studies (Stogdill & Coons, 1957). These dimensions characterize leader behaviors at their broadest and most general level and have been effective for conceptualizing leader behaviors generally. Considering the existence of these two general factors, the resulting degree of convergence between the CLB taxonomy and the general taxonomies of Fleishman et al. (1991) and Yukl (2012) was to be expected.

The unique contribution of the present taxonomy lies in the application of to the construction context. The differences between the CLB taxonomy and the general leadership taxonomies highlight the effect of context, as 12 and 13 unique categories were identified in the CLB taxonomy. The majority of the CLB taxonomy's unique contributions occur at the category level, suggesting that the general leadership taxonomies adequately generalize at the dimension level. The CLB taxonomy therefore provides unique context specificity at the category level while still aligning with extant general leadership theory.

Much of the CLB taxonomy's unique contribution lies in its emphasis on safety and ethical components of leadership. Whereas previous leader behavior research focused on the effects of leadership on follower job performance (Fleishman et al., 1991), the CLB taxonomy considers safety and ethical leadership in a high-risk environment. Provided that improving leadership can lead to better health and safety outcomes (Kelloway & Barling, 2010), such context-specific behavioral information could be useful to construction researchers and practitioners. The ethical component that emerged in categories such as *demonstrating work integrity* and *leading by example* also reflect emergent research on the effectiveness of ethical leadership (Brown et al., 2005). Yukl (2012) noted that early efforts to categorize leader behaviors, including his own, did not tend to specify ethical behaviors and this critique was realized when categories relating to ethical behaviors in the CLB taxonomy did not converge with Fleishman et al.'s (1991) and Yukl et al.'s (2002; 2012) taxonomies. To summarize, the CLB taxonomy converged with existing general leadership taxonomies yet contributed elements unique to the construction industry context, thereby demonstrating both its consistency with previous leadership research and its contribution to construction leadership research.

## Theoretical and Research Implications

The results of the present study have implications for both general leadership theory and construction-specific leadership theory. The above comparison between the construction-specific CLB taxonomy and general leader behavior taxonomies (Fleishman et al., 1991; Yukl et al., 2002, 2012) provided an illustration of the bandwidth-fidelity debate (Ones & Viswesvaran, 1996) in the leadership context (Tett et al., 2000). Previous research has indicated that measurement of leader behaviors can vary across industries and contexts (Antonakis et al., 2003). The influence of context was evident when approximately one-third of categories were unique to the CLB taxonomy when compared to general leadership taxonomies. Given this unique contribution, future research should examine the extent to which industry-specific categories incrementally predict industry-specific leadership outcomes (e.g., safety performance) relative to general leadership theories. To highlight the influence of context, safety-related behaviors were rated by SMEs as the most critical CLBs for foremen. By using a general leadership taxonomy, construction researchers may be less likely to consider safety-related behaviors as distinct from task-oriented behaviors. As such, matching criterion that are known to be important in a specific context (e.g., safety performance) to CLBs that align better with that criterion (e.g., *prioritizing safety and well-being*) may result in better prediction than using a general task-oriented category (e.g., *monitoring operations*; Yukl et al., 2002, 2012).

In addition, the CLB taxonomy could provide a uniform base for conducting construction leadership research. At present, construction leadership research varies in its use of leadership theories (Toor & Ofori, 2008). One strength of using varying leadership theories is that by using different perspectives, flaws in other perspectives can be exposed. Conversely, the use of multiple theories to study the same topic can act as moderators and make it difficult to disentangle differences in observed results between studies. When leadership theory acts as a moderator, it is unclear whether conflicting results are due to the use of different theoretical approaches, true differences in the construct of interest, or contextual effects (Avolio et al., 2009). For example, two studies from the construction leadership literature used in the grounded theory analysis were Skipper and Bell (2006) and Traibherm (2003). Skipper and Bell used the Kouzes-Posner Leadership Practices Inventory (2003) and Traibherm used a combination of

Fiedler's Contingency Model (1972) and path-goal theory (House & Mitchell, 1974). In comparing results, it is therefore unclear whether the differences in findings are due to the leadership theories they utilized, the context in which they did their research, or actual conflicting findings regarding effective leadership. The CLB taxonomy provides a solution to this problem in that it is a comprehensive uniform starting point for conducting future construction leadership research.

**Practical Implications**

The practical utility of the CLB taxonomy lies at the behavior level where specific CLBs can be assessed for relevance and used for selection, training, and performance appraisal (Tett et al., 2000). In a selection context, specific CLBs (e.g., seeks multiple perspectives when solving problems) can be used to create specific behavioral job descriptions. Such specificity could be useful for increasing applicants' understanding of the role and stimulating cognition regarding their fit with the requirements of the position. Rogers (2007) found that journeymen have negative perceptions of requirements associated with serving as a foreman and that these negative perceptions are a barrier for getting journeymen to accept foremen roles. Despite the fact that realistic job preview research has found that more information about a job can hinder the attractiveness of a position (Rynes, 1991), journeyman who already have a negative perception of the foreman role may actually benefit from a more balanced explication of the job requirements. Clarification of job requirements could then help alleviate ambiguity and improve recruitment.

In the training context, Ely et al. (2010) used both Fleishman et al.'s (1991) and Yukl et al.'s (2002; 2012) taxonomies to evaluate the effectiveness of leadership training across 49 studies. The CLB taxonomy could serve a similar purpose by providing a framework for needs assessment (Surface, 2012), training development (Martin, Kolomitro, & Lam, 2014), and training evaluation (Avolio et al., 2009; Kirkpatrick, 2008). Specific CLBs can be identified as potential targets for improvement in a needs assessment, integrated into training content, and used as criteria for measuring the success of the training intervention. Multi-source ratings of CLB taxonomy behaviors could also be used in performance appraisal by upper management who can request behavioral ratings from superiors or subordinates regarding the presence or absence of each CLB (e.g., gets along well with others). Those ratings could then integrated with other performance metrics (e.g., project team performance) into a performance rating for each foreman (Barling, Weber, & Kelloway, 1996). Overall, the practical utility of the CLB taxonomy lies in its potential use in recruitment, training, and performance appraisal.

**Strengths, Limitations, and Directions for Future Research**

The present research contains several methodological considerations that strengthen conclusions about the validity of the taxonomy. One strength of this study is its focus on observable behaviors which are more easily measured than traits. Leadership has been examined as both a trait and a behavior (Barling et al., 2011), and the operational definition in the present study used a behavioral definition (Northouse, 2014). The emphasis on behaviors over traits is derived from the understanding that traits are related to and precede leader behaviors (Judge, Bono, Ilies, & Gerhardt, 2002) and that behaviors can be trained (Avolio et al., 2009) whereas traits are stable (Cobb-Clark & Schurer, 2012). Thus, focusing on behaviors is essential for determining what makes a foreman effective. However, behaviors do not exist in a vacuum. Future research should therefore seek to identify trait (e.g., extraversion; Judge et al., 2002) and situational (e.g., amount of sub-contractors, Bresnen et al., 1986) moderators of the effective CLBs identified in the present taxonomy.

Another strength relates to the use of archival focus group data in Phase 1. Denzin and Lincoln (2005) outline the benefits of focus groups, which include capitalization on social cues and a naturalistic environment in which focus group participants assist one another in recall. In the focus groups, participants were able to discuss their experiences with effective leaders, aiding each other in recall and arriving at collective conclusions regarding the effectiveness of the CLBs identified.

A third strength of the present study was in the use of grounded theory to supplement extant research by examining the effects of contextualization to similar but disparate domains (Birk & Mills, 2011). When compared to extant taxonomies of leader behaviors (e.g., Fleishman et al., 1991; Yukl et al., 2002; 2012), certain CLBs emerged as unique to the construction context. Extant taxonomies did not perfectly generalize and several categories and dimensions in the CLB taxonomy did not correspond to any categories/dimensions (e.g., *Demonstrating Effort and Integrity* in Fleishman). The unique categories that emerged from the grounded theory analysis therefore provide potential avenues of exploration, answering the call for new theory from construction leadership researchers (Rogers, 2007; Toor & Ofori, 2008).

A limitation of the qualitative method used in the first phase was the use of the follower perspective in the focus groups (i.e., "think of a good leader you had one time"), as it is possible that leaders have different perceptions than their followers for what behaviors are effective. However, the degree to which a CLB was effective is not relevant, as the CLB met a minimum effectiveness criterion to be remembered by the participants as such. Thus, the varying degrees of effectiveness for each category of CLBs is a possible subject of future research. A second drawback to the phrasing of the prompt in the focus group is that CLBs recalled were reported from the perspective of subordinates within the organization. This means that behaviors directed outside of the organization were not asked about, which is a category in Yukl's (2002; 2012) taxonomy. The impact of this limitation was mitigated via the construction leadership literature review supplementation in the grounded theory analysis which resulted in the incorporation of the externally-oriented CLBs category.

A limitation regarding the grounded theory analysis is that it may be subject to bias regarding what is expected to emerge in the data (Tufford & Newman, 2012). The effect of this was lessened by utilizing the bracketing technique (Corbin & Strauss, 2008) where preconceptions were written out by each analyst and consciously avoided. Acknowledgment of this bias was also the purpose of Study 1, which sought to replicate the structure of the taxonomy.

Strengths in Study 1 were the use of leadership SMEs, frame-of-reference training (Schleicher et al., 2002), and the randomization of categories and dimensions during the coding task which limited the influence of order effects. Coders who were knowledgeable about leadership were able to apply that knowledge to the coding task and had a rich understanding of the general factors of leader behaviors. The use of FOR training helped ensure that all coders had a similar understanding about the role of foremen, lending consistency to their schemas when coding. Randomization of categories and dimensions in each coders' codebook helped prevent systematic primacy bias whereby categories and dimensions listed earlier in the codebook would have had a greater number of CLBs coded into them at the expense of categories and dimensions listed later that may have better matched the CLBs.

A limitation in Study 1 were pre-existing differences in construction knowledge between coders. While all coders were experts in leadership, knowledge about construction literature varied. This knowledge gap may have attenuated agreement statistics, suggesting that those with greater exposure to construction literature are more likely to agree with the grounded theory analysts' taxonomic structure. The FOR training was implemented as a countermeasure, but may have been insufficient. Therefore, future research should formally assess context-specific knowledge or ensure that SMEs have a minimum level of knowledge about all relevant subject matters (i.e., both construction and leadership).

A strength in Study 2 was the use of construction industry SMEs with varying levels of experience, which helped bridge the research-to-practice gap by obtaining the opinions of those who understand the foreman role. Another strength was the inclusion of the construction manager categories in Study 2, which supports the validity of category ratings such that SMEs did not acquiesce or otherwise distort their responses.

Small sample size, both in terms of SMEs and organizations, was a limitation in Study 2. A larger sample would have been more representative, however the construction leader population was difficult to recruit, as evidenced by the extremely low 3.45% organizational response rate. Without industry connections, obtaining a sample size much higher would be unlikely. A second limitation is that 37 of 76 nominations came from one organization. As such, the results of Study 2 may have been biased to the extent that SMEs from that organization are not representative of the construction leader population. If the contributing organization's culture, climate, beliefs, and attitudes regarding effective leadership systematically differ from those of other organizations, ratings may be biased. The effect of this limitation could not be tested due to small sample size and the anonymous nature of the survey. Thus, future research should examine the measurement equivalence of category ratings in order to examine differences between ratings provided by SMEs in different organizations.

A third limitation for Study 2 was that all construction firms sampled were in the United States. Construction leadership literature spans the world, so cultural differences may influence the effectiveness of leadership. There is evidence that effective leadership generalizes, as DiStefano, DiStefano, and Boehnke (1997) found that transformational leader behaviors were effective across cultures, but others (Hamlin & Hatton, 2013) have found differences across cultures. The Global Leadership and Organizational Behavior Effectiveness project (House et al., 1999) found that the perceived effectiveness of charismatic, team-oriented, humane, and participative leader behaviors all tended to be perceived similarly across 61 countries, whereas self-protective and autonomous leadership varied by country. Given this finding, it is possible that the generalizability of the CLB taxonomy to other countries does not have a dichotomous answer, but is rather a spectrum depending on the country in which it is being used. Future research should test this taxonomy in other countries and examine how criticality ratings subsequently vary.

Another limitation relates to potential ratings inflation based on two factors: (1) selection bias and (2) espoused safety values in the construction industry. When recruiting SMEs, invitations to the survey contained language pertaining to safety. As such, there may have been a self-selection bias such that SMEs who adhere to beliefs in the paramount importance of safety may have been more likely to participate. Similarly, “safety first” is a frequently espoused organizational value in high-risk industries (Schwartz, 1999), which may have led to socially desirable responding. Therefore, while safety-related behaviors may in fact be the most critical types of CLBs, social desirability may have influenced ratings such that SMEs were reluctant to rate safety-related CLBs as anything less than the utmost critical.

Last, future research should develop a measure of effective CLBs based on this taxonomy and validate it in a sample of construction workers using factor analytic methods in order to explore and confirm the structure of the taxonomy. Predictive validity (Derue. Nahrgang, Wellman, & Humphrey, 2011) should also be assessed, specifically for the criteria of safety performance (Christian et al., 2009), individual and team performance, and team cohesiveness, which are all positively linked to leader behaviors (Avolio et al., 2009). Such a study should include leadership ratings from subordinates, peers, and superiors with a longitudinal design in order to more accurately capture the effectiveness of the CLBs specified in the taxonomy.

**Conclusion**

Construction is a crucial part of world industry. Everyone has a stake in its success, yet operational inefficiency, unsafe practices, and ineffective leadership plague the industry. The taxonomy developed herein is an initial attempt to categorize the CLBs first-line foremen can utilize in order to obtain positive results from their workers and ensure safe and healthy project sites. Foremen are critical to the safety and well-being of construction workers as well as the success of their projects. In Phase 1, an initial CLB taxonomy was developed based on a grounded theory analysis of archival focus group data (Hoffmeister et al., 2011) conducted by three subject matter experts and supplemented by construction leadership literature.

In Phase 2, evidence was collected for the internal and external validity of the CLB taxonomy via coding of 311 CLBs into 36 categories and 36 categories into 10 dimensions by five leadership SMEs. Next, evidence for the external validity of the taxonomy was collected via ratings of importance and relevance for each CLB taxonomy category by 39 experienced construction industry leaders. Interrater agreement statistics supported both the structure of the taxonomy (Study 1) and the stability of SME importance and relevance category ratings (Study

2). Additionally, the inclusion of a manipulation check demonstrated evidence of discriminant validity between construction manager leader behaviors and foreman leader behaviors. Also emerging from Study 2 was the finding that all CLB categories were rated as at least moderately critical, safety-related CLBs were perceived as most critical, and person-oriented CLB categories were rated least critical.

The taxonomy was then compared to two extant leader behavior taxonomies (Fleishman et al., 1991; Yukl et al., 2002; 2012) and demonstrated similarities and differences, leading to the conclusion that the role of the first-line foreman requires leader behaviors unique to the construction context (e.g., prioritizes safety over production goals) but also requires general leader behaviors in alignment with previous research (e.g., arrives at solutions that benefit everyone). For researchers, the taxonomy can provide a uniform starting point for conducting construction leadership research, thereby controlling for theoretical differences in leadership theories. Further, the present study contributes to the fidelity-bandwidth debate in favor of fidelity. When a case can be made for the uniqueness of a certain position (i.e., first-line foremen), fidelity can be more useful than bandwidth since generally effective leader behaviors may not perfectly generalize to unique contexts. For practitioners, the present taxonomy can be used in recruitment, selection, training, and performance appraisal of foremen. Hopefully this taxonomy will be useful for advancing construction leadership research and practice and help alleviate the struggles of an industry that is facing a leadership crisis.

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# APPENDIX A

## LeAD FOCUS GROUP QUESTIONS

**Opening script/description of study** [*5 minutes*]
"Hi, my name is (your name), and this is (other person's name). We are graduate students at Colorado State University, and today we would like to talk with you about your ideas of leadership and safety in the workplace. We are interested in finding out what are some important leadership characteristics and skills that promote safety in the construction industry. Your responses will be kept completely confidential and will be used for research purposes only, and you will not be identified in any way in future publications. While (Name of notetaker) will be writing down what you say, she will not be writing down any names to connect you to what you say."

**Opening question** [*5 minutes*]

1. Let's go around the table to introduce everyone, tell us who you are, and what you enjoy doing when you are not at work.

**Warm-up question and example** [*10 minutes*]
We would first like to get everyone to think about how we describe others' behaviors. We will ask you to describe various leadership skills and habits over the next hour or so. While we think that general descriptions are helpful, we would also like you to provide specific examples of these habits.
For example, if you think that someone has "good communication skills," tell us what you mean when you say "good communication skills." Examples of this might be, "He lets the team know that he ordered the materials we need," "He explains how to do the job thoroughly," or "He regularly checks with us to see if there are any questions or problems."
Let's do a warm-up question to describe someone's skills and habits:

2. Think of a good football coach. What specific things does he do that makes him a good leader for the team? [*Write these on the board. Pick out some of the more vague ones such as "Good communication" or "Professional attitude," and ask focus group participants what some specific behaviors would be. If all the responses are specific enough, make sure to mention this before moving on. Another probe might be: How would a good football coach act in a stressful situation?]*

**Main questions** [*60 minutes*]

3. Think of a really good leader you had one time. When you think about this leader, I want you to think about the specific things they did or what skills they had that made them better than just an average leader. So thinking of this, I want you to write down a specific incident where they demonstrated these skills. What did they do? How did they act? When you're done writing these down we'll go around and talk about them as a group. *Give them 5 minutes or so (until people stop writing).*

Alright, now that you've written down some specific situations that you have seen a person be a great leader, I want to talk about them together. When we go around and talk about these I want you to sort of help each other formulate these ideas, so if someone says something similar to what you have, feel free to join in and add your own stories or opinions. *List specific details of situation on board for everyone to see. [30 minutes]*

a. *If they start listing general*: Remember just like we did in the example, we're trying to get really specific. Give me specific habits this leader has, or specific tasks that they do that make them X.
b. *If they still list general*: Can you be more specific? Tell me what you mean by "X."
c. *Probing question:* How would a great leader act in a stressful situation, or in an unsafe situation, as opposed to simply a good leader? What would distinguish these two in this situation?

4. Out of these listed up here on the board, I want you to go around and pick your top three in terms of which you think would have the largest impact on safety on the job, and tell me why you feel that way—why did you choose these three, and how do they impact safety more than the others? *Tally those that are mentioned.[20 minutes]*

    a. *Probing question:* What could a great leader do to make the jobsite safer?

**Ending questions** [*5 minutes*]

5. Is there anything else that comes to mind or that we should consider?

**Closing script** [*5 minutes*]

"Like we said in the beginning, we're trying to identify leadership skills that are important to promoting safety in the construction industry. We are developing a safety leadership program that will target and train these leadership skills, and your responses have been very helpful in helping us do this. Thank you very much for your time and participation! If you have any questions or further comments, feel free to contact me at this email address and/or phone number. *Write contact info on board.*"

## APPENDIX B

## IDENTIFICATION AND CATEGORIZATION OF EFFECTIVE CONSTRUCTION LEADER BEHAVIORS FROM CONSTRUCTION LEADERSHIP LITERATURE

| Behavior | Category | Reference |
|---|---|---|
| Takes interest in others' work | Building and maintaining relationships | Adams, 2007 |
| Develops cooperative relationships with others in company | Building and maintaining relationships | Adams, 2007 |
| Encourages good work through friendship | Building and maintaining relationships | Enshassi & Burgess, 1991 |
| Maintains a friendly working relationship | Building and maintaining relationships | Traibherm 2003 |
| Does little things to make the subordinates pleased | Building and maintaining relationships | Traibherm 2003 |
| Is approachable and friendly | Communicating politely in language and tone | Adams, 2007 |
| Is approachable | Communicating politely in language and tone | Dainty et al., 2005 |
| Is friendly and approachable to subordinates | Communicating politely in language and tone | Enshassi & Burgess, 1991 |
| Sets measurable standards for excellence | Communicating roles and expectations | Adams, 2007 |
| Aggressively pursues assignments until completion | Demonstrating effort and dedication | Adams, 2007 |
| Does everything possible to meet deadlines | Demonstrating effort and dedication | Adams, 2007 |
| Describes a proposed task or activity with enthusiasm and conviction | Demonstrating effort and dedication | Dulaimi et al., 2005 |
| Shows tenacity in overcoming obstacles | Demonstrating effort and dedication | Dulaimi et al., 2005 |
| Displays enthusiasm and ambition | Demonstrating effort and dedication | Dainty et al., 2005 |
| Displays self-discipline | Demonstrating effort and dedication | Dainty et al., 2005 |
| Displays time management | Demonstrating effort and dedication | Dainty et al., 2005 |
| Makes an effort to meet client requirements | Demonstrating effort and dedication | Dainty et al., 2005 |
| Acts consistently with words | Demonstrating work integrity | Adams, 2007 |

Appendix B continued.

| Behavior | Category | Reference |
|---|---|---|
| Follows through on promises | Demonstrating work integrity | Adams, 2007 |
| Puts project goals before their own goals | Demonstrating work integrity | Dainty et al., 2005 |
| Keeps promises | Demonstrating work integrity | Koskenvesa & Sahlstedt, 2012 |
| Demonstrates personal values | Demonstrating work integrity | Skipper & Bell, 2006 |
| Does what they say they will do | Demonstrating work integrity | Skipper & Bell, 2006 |
| Effectively markets work group's projects and programs | Encouraging involvement | Adams, 2007 |
| Persuades, influences, convinces, and impresses others | Encouraging involvement | Dainty et al., 2005 |
| Appeals to team members' values, ideals, and aspirations when proposing new ideas | Encouraging involvement | Dulaimi et al., 2005 |
| Installs proper motivation systems | Encouraging involvement | Dulaimi & Langford, 1999 |
| Encourages alternative approaches and new ideas | Encouraging upward voice and feedback | Adams, 2007 |
| Seeks feedback from others | Encouraging upward voice and feedback | Adams, 2007 |
| Tells others what they are trying to accomplish and if they know a good way to do it | Encouraging upward voice and feedback | Dulaimi et al., 2005 |
| Encourages project team members to express concerns or doubts about innovation proposed | Encouraging upward voice and feedback | Dulaimi et al., 2005 |
| Involves project team members in planning/decision-making process | Encouraging upward voice and feedback | Dulaimi et al., 2005 |
| Accepts feedback | Encouraging upward voice and feedback | Dulaimi et al., 2005 |
| Establishes flow of two-way communication within project | Encouraging upward voice and feedback | Dulaimi & Langford, 1999 |
| Holds meetings for discussing work force problems | Encouraging upward voice and feedback | Enshassi & Burgess, 1991 |

Appendix B continued.

| Behavior | Category | Reference |
|---|---|---|
| Consults with subordinates when facing a problem | Encouraging upward voice and feedback | Traibherm 2003 |
| Listens to subordinates' ideas and suggestions | Encouraging upward voice and feedback | Traibherm 2003 |
| Asks for suggestions concerning what to do | Encouraging upward voice and feedback | Traibherm 2003 |
| Helps people understand how work contributes to broader objectives | Explaining task rationale | Adams, 2007 |
| Uses logic to convince project parties | Explaining task rationale | Dulaimi et al., 2005 |
| Gives appropriate balance of positive and constructive feedback | Giving constructive feedback | Adams, 2007 |
| Gives honest feedback | Giving constructive feedback | Adams, 2007 |
| Provides definite sense of direction | Giving direction about tasks and goals | Adams, 2007 |
| Translates organizational vision into meaningful goals | Giving direction about tasks and goals | Adams, 2007 |
| Directs workers toward compliance with their wishes | Giving direction about tasks and goals | Dainty et al., 2005 |
| Gives workers opportunity to get involved in work they can perform best | Giving direction about tasks and goals | Dulaimi & Langford, 1999 |
| Goes through tasks and confirms at project startup meeting | Giving direction about tasks and goals | Koskenvesa & Sahlstedt, 2012 |
| Defines scope of work | Giving direction about tasks and goals | Naoum et al., 2004 |
| Identifies major work tasks | Giving direction about tasks and goals | Naoum et al., 2004 |
| Uses technical knowledge to help troubleshoot | Helping out with tasks | Adams, 2007 |
| Constructively challenges the usual approach | Innovating | Adams, 2007 |
| Works to improve new ideas rather than discourage | Innovating | Adams, 2007 |

Appendix B continued.

| Behavior | Category | Reference |
|---|---|---|
| Finds and creates new opportunities within and outside of project environment | Innovating | Dainty et al., 2005 |
| Provides evidence that proposed innovation is likely to succeed | Innovating | Dulaimi et al., 2005 |
| Seeks out new technologies, processes, techniques, and/or product ideas | Innovating | Dulaimi et al., 2005 |
| Challenges the way it has been done before as the only answer | Innovating | Dulaimi et al., 2005 |
| Expresses confidence in what the innovation can do and achieve | Innovating | Dulaimi et al., 2005 |
| Enthusiastically promotes advantages of new ideas and solutions | Innovating | Dulaimi et al., 2005 |
| Pushes innovation actively and vigorously | Innovating | Dulaimi et al., 2005 |
| Shows optimism about success of innovation | Innovating | Dulaimi et al., 2005 |
| Shares an image of possibilities to inspire | Innovating | Skipper & Bell, 2006 |
| Searches for new opportunities to improve processes | Innovating | Skipper & Bell, 2006 |
| Ensures unit works well with other work groups | Interacting with external parties | Adams, 2007 |
| Represents the work group to outside groups well | Interacting with external parties | Adams, 2007 |
| Interfaces with outside work groups | Interacting with external parties | Dainty et al., 2005 |
| Maintains long-term relationships with clients | Interacting with external parties | Dainty et al., 2005 |
| Maintains a network of contacts | Interacting with external parties | Dulaimi et al., 2005 |
| Establishes flow of two-way communication with outside settings | Interacting with external parties | Dulaimi & Langford, 1999 |

Appendix B continued.

| Behavior | Category | Reference |
|---|---|---|
| Builds relationships with subcontractors | Interacting with external parties | Koskenvesa & Sahlstedt, 2012 |
| Walks the talk | Leading by example and modeling | Adams, 2007 |
| Leads by example | Leading by example and modeling | Adams, 2007 |
| Sets an example | Leading by example and modeling | Skipper & Bell, 2006 |
| Handles difficult situations constructively and tactfully | Managing interpersonal conflict | Adams, 2007 |
| Eliminates interpersonal conflicts | Managing interpersonal conflict | Dulaimi & Langford, 1999 |
| Expresses genuinely concern about others' career development | Mentoring | Adams, 2007 |
| Supports others' growth and success | Mentoring | Adams, 2007 |
| Observes project team task performance | Monitoring performance | Dulaimi & Langford, 1999 |
| Practices close supervision to reduce unexpected errors | Monitoring performance | Enshassi & Burgess, 1991 |
| Keeps a close eye on subordinates' work to make sure they understand the instruction | Monitoring performance | Enshassi & Burgess, 1991 |
| Promotes a spirit of improvement | Motivating and encouraging involvement | Adams, 2007 |
| Energizes people to go the extra mile | Motivating and encouraging involvement | Adams, 2007 |
| Coordinates | Planning and organizing projects | Dainty et al., 2005 |
| Manages resources | Planning and organizing projects | Dainty et al., 2005 |
| Coordinates and brings together key individuals | Planning and organizing projects | Dulaimi et al., 2005 |
| Gets necessary resources (e.g., people, time, dollars) to implement new ideas, technologies, and/or solutions | Planning and organizing projects | Dulaimi et al., 2005 |
| Plans the project | Planning and organizing projects | Dulaimi & Langford, 1999 |
| Controls project environment and resources | Planning and organizing projects | Dulaimi & Langford, 1999 |
| Manages labor | Planning and organizing projects | Dulaimi & Langford, 1999 |
| Organizes and coordinating tasks among different groups on site | Planning and organizing projects | Dulaimi & Langford, 1999 |

Appendix B continued.

| Behavior | Category | Reference |
|---|---|---|
| Uses detailed scheduling | Planning and organizing projects | Koskenvesa & Sahlstedt, 2012 |
| Creates high-quality project designs | Planning and organizing projects | Koskenvesa & Sahlstedt, 2012 |
| Plans efforts | Planning and organizing projects | Naoum et al., 2004 |
| Balances productivity and employee needs | Promoting safety and well-being | Adams, 2007 |
| Manages health and safety | Promoting safety and well-being | Dainty et al., 2005 |
| Holds regular safety meetings | Promoting safety and well-being | Mohamed, 2002 |
| Includes subcontractors in safety meetings | Promoting safety and well-being | Mohamed, 2002 |
| Demonstrates commitment to safety | Promoting safety and well-being | Slates, 2008 |
| Models proper safety behaviors | Promoting safety and well-being | Slates, 2008 |
| Promotes spirit of cooperation with others in work group | Promoting teamwork | Adams, 2007 |
| Works cooperatively | Promoting teamwork | Dainty et al., 2005 |
| Sets up harmonious and cooperative working environment among parties | Promoting teamwork | Dulaimi et al., 2005 |
| Creates a good team spirit | Promoting teamwork | Naoum et al., 2004 |
| Encourages a partnering philosophy | Promoting teamwork | Naoum et al., 2004 |
| Makes a constructive effort to change and improve based on others' feedback | Providing autonomy and empowerment | Adams, 2007 |
| Involves project team in decision making | Providing autonomy and empowerment | Naoum et al., 2004 |
| Manages materials | Providing material support | Dulaimi & Langford, 1999 |
| Encourages subordinates to feel that they can come to them with their personal problems | Providing social support | Enshassi & Burgess, 1991 |
| Flexibly adapts to a variety of situations | Regulating emotions | Dainty et al., 2005 |
| Keeps emotions appropriate to environment or situation, no matter how stressful | Regulating emotions | Dainty et al., 2005 |
| Keeps project stakeholders involved in the process | Sharing project information | Dulaimi et al., 2005 |

Appendix B continued.

| Behavior | Category | Reference |
|---|---|---|
| Generates creative solutions to problems | Solving problems | Adams, 2007 |
| Recognizes key issues | Solving problems | Dainty et al., 2005 |
| Solves problems | Solving problems | Dainty et al., 2005 |
| Takes proactive actions to avert problems | Solving problems | Dainty et al., 2005 |
| Seeks differing perspectives when solving problems | Solving problems | Dulaimi et al., 2005 |
| Gets the problems into the hands of people who can solve them | Solving problems | Dulaimi et al., 2005 |
| Is proactive not reactive | Solving problems | Koskenvesa & Sahlstedt, 2012 |
| Takes responsibility for outcomes | Taking responsibility | Adams, 2007 |
| Admits weaknesses | Taking responsibility | Dainty et al., 2005 |
| Learns from mistakes | Taking responsibility | Dainty et al., 2005 |
| Accepts responsibility for results | Taking responsibility | Dulaimi et al., 2005 |
| Transfers knowledge | Teaching | Dainty et al., 2005 |
| Gets others to look at problems from many different angles | Teaching | Dulaimi et al., 2005 |
| Counsels for skill and experience development | Teaching | Dulaimi & Langford, 1999 |
| Is fair and equal in subordinate dealings | Treating employees equally | Enshassi & Burgess, 1991 |
| Respects workers | Treating others with respect | Koskenvesa & Sahlstedt, 2012 |

# APPENDIX C

## FRAME OF REFERENCE TRAINING MATERIALS

**Frame of Reference Training Information Sheet**

**Leader behavior:** An observable action that influences another toward a goal.

**Construction Foremen Job Description**

A foreman supervises and coordinates the work of a crew of workers in a specific craft or trade. Foremen are primarily concerned with seeing that the workers under them do their job skillfully and efficiently, and that assigned work progresses on schedule. They deal with the routing of material and equipment, and with the laying out of the more difficult areas of the job.

The work requires quick, clear thinking and quick onsite decisions. Foremen should have a broad working knowledge of a craft; must be able to read and visualize objects from blueprints; and should have an eye for precise detail. Working conditions for foremen can vary greatly depending upon the craft line being supervised. However, the great majority of work will be onsite and out of doors, often resulting in prolonged standing, as well as some strenuous physical activity. To become a foreman, a craftsman must illustrate an above average knowledge of all faces of a particular trade and do noticeably good work consistently.

A foreman should have the same basic aptitude and interests as those working in the craft being supervised, plus additional reading, writing, and math skills. The ability to motivate workers and communicate with both them and superiors is essential. A foreman must often lead by example. Being an entry level/first line management position, a foreman who exhibits solid rapport and communications with his or her workers and superiors; who leads by example; who has outstanding skills and trade knowledge; who gets the job done properly and on schedule; and who works to improve his/her management skills will often be in line for promotion into a supervisory position. With the proper background and initiative a foreman may progress to a superintendent, general superintendent, vice president, or even an owner of a construction company.

**Taxonomy Categories**

1. **Solving problems:** Addresses the most important problems, provides multiple solutions, and implements the best solution.

2. **Managing interpersonal conflict:** Mediates and objectively resolves conflicts between workers.

3. **Managing change and emergencies:** Acts decisively to resolve emergencies.

4. **Regulating emotions:** Exhibits temperaments that are appropriate to the situation.

5. **Building and maintaining relationships:** Develops relationships by getting to know workers individually.

6. **Promoting teamwork:** Develops a collective mindset by communicating the importance of working as a team and encouraging comradery within and across crews.

7. **Sharing project information:** Provides workers and stakeholders with project information and status updates.

8. **Communicating politely in language and tone:** Speaks with workers instead of at workers and avoids harsh or offensive language.

9. **Treating workers equally:** Consistently treats workers at all levels fairly and does not show favoritism, especially when enforcing rules.

10. **Treating workers with respect:** Communicates with and acts respectfully toward workers, other trades, and contractors.

11. **Taking responsibility:** Holds themselves accountable for their actions and the actions of their workers.

12. **Demonstrating work integrity:** Holds themselves to the same standards as workers with regards to work times, well-being, and privileges.

13. **Demonstrating effort and dedication:** Is prompt, presentable, demonstrates high effort, and exhibits pride in their work.

14. **Communicating honestly:** Is transparent with workers about all aspects of the project and admits when they do not know something.

15. **Leading by example and modeling:** Acts as the role model in all aspects of work and safety

16. **Teaching:** Takes time to train workers how to conduct tasks, allows workers to try the tasks, then gives corrective feedback and asks questions to make sure workers understand.

17. **Mentoring:** Coaches workers to help them develop knowledge and skills while sharing their knowledge about the trade.

18. **Providing autonomy and empowerment:** Delegates authority, allows workers to design their own systems of work, and does not micromanage.

19. **Encouraging involvement:** Encourages workers to immerse themselves in job tasks and motivates organizational involvement.

20. **Encouraging upward voice and feedback:** Asks for and allows workers to offer suggestions, voice their concerns, and ask questions in any situation.

21. **Communicating roles and expectations:** Assigns roles to workers and clarifies performance expectations.

22. **Explaining task rationale:** Explains to workers why they are doing each task.

23. **Giving direction about tasks and goals:** Gives specific and clear directions about task and safety goals, priorities, and instructions, then assigns tasks based on workers' skill level.

24. **Monitoring performance:** Checks in with workers periodically throughout the workday to assess progress.

25. **Giving recognition:** Publicly praises and thanks workers often for a job well done.

26. **Giving constructive feedback:** Provides constructive feedback in a private, timely, and accurate manner.

27. **Planning and organizing projects:** Reviews the project with workers, engineers, and clients, plans project tasks in advance, and keeps detailed records on progress.

28. **Providing material support:** Ensures equipment, materials, and safety gear are stocked and ready before workers need to use them.

29. **Solving safety problems:** Acts quickly to correct safety problems and stops work if conditions are unsafe.

30. **Monitoring and maintaining project site safety:** Demonstrates the safety of the equipment, actively monitors the project site, and identifies potential safety hazards.

31. **Prioritizing safety and well-being:** Emphasizes safety and worker well-being over all other project goals.

32. **Being approachable and available:** Allows workers to come and talk to them whenever they need to, is approachable, and responds to questions in a timely manner.

33. **Helping out with tasks:** Assists workers as needed or if safety is a concern.

34. **Providing social support:** Stands up for workers and is flexible about non-work needs and demands.

35. **Innovating:** Challenges the status quo, champions innovation, and stimulates workers' creativity, support for, and involvement with innovation processes.

36. **Interacting with external parties:** Represents the work group well when building relationships with outside parties.

**Taxonomy Dimensions**

1. **Adapting and Resolving:** Solves project problems, interpersonal conflicts, and emergencies while maintaining an even temperament.

2. **Building and Promoting Relations:** Uses interpersonal skills to promote teamwork and build relationships with workers and outside parties.

3. **Demonstrating Effort and Integrity:** Treats workers fairly and respectfully, shares project information, and models the behavior and demeanor they desire from their workers.

4. **Developing Followers:** Teaches workers how to do tasks and skills and mentors them in their career development.

5. **Inspiring and Empowering:** Encourages worker feedback and involvement, delegates authority, and allows for worker autonomy.

6. **Managing Performance:** Details workers' tasks and roles, monitors worker performance, gives recognition, and provides constructive feedback.

7. **Planning and Organizing:** Plans the project, organizes project tasks, and equips the project site with necessary materials.

8. **Promoting Safety and Well-being:** Monitors project site safety, resolves safety problems, and prioritizes worker safety and well-being above all other project goals.

9. **Providing Support:** Assists workers with tasks, is available, responds to questions, and is flexible concerning nonwork demands.

10. **Innovating:** Challenges the status quo, champions innovation, and stimulates workers' creativity, support for, and involvement with innovation processes.

# APPENDIX D

# NOMINATION AND SURVEY INVITATION E-MAILS

## 1. Construction Leader Nomination E-mail for Construction Unions and Professional Construction Associations – First Attempt

Dear [Union name],

We are researchers from Old Dominion University (Norfolk, VA) who are conducting a research study to better understand competencies that make foremen effective in the construction industry. As you know, the construction industry is an important part of the U.S. economy and effective leadership plays a key role in its continued success.

We are contacting you to request a nomination of 5-10 (or more) exceptional leaders, who are members of your organization, to participate in the study. We want to ask exceptional construction leaders for their opinions on a number of competencies for effective foremen using a 15 minute online survey. To receive a nomination, leaders should have extensive work experience in foreman positions and/or supervising/observing foremen performance.

Exceptional leaders will be informed of their nomination and receive the same information about the research study provided to you in this e-mail. We would be happy to share the results of our study with your organization.

If you are interested in helping us with this effort, please reply with names and e-mail addresses of exceptional construction leaders you would like to nominate for this project. Questions are welcome.

We look forward to your assistance,

Enrique Cabrera-Caban
Dr. Konstantin Cigularov
Old Dominion University

## 2. Construction Leader Nomination E-mail for Construction Unions and Professional Construction Associations – One-week Reminder

Dear Mr./Mrs. [Last name],

Recently, we sent an e-mail requesting your organization's assistance in this research study. We have not heard back regarding this request, and are sending this e-mail as a reminder that we are still greatly interested in your help.

We are researchers from Old Dominion University (Norfolk, VA) who are conducting a research study to better understand competencies that make foremen effective in the construction industry. As you know, the construction industry is an important part of the U.S. economy and effective leadership plays a key role in its continued success.

We are contacting you to request a nomination of 5-10 (or more) exceptional leaders, who are members of your organization, to participate in the study. We want to ask exceptional construction leaders for their opinions on a number of competencies for effective foremen using a 15 minute online survey. To receive a nomination, leaders should have extensive work experience in foreman positions and/or supervising/observing foremen performance.

Exceptional leaders will be informed of their nomination and receive the same information about the research study provided to you in this e-mail. I would be happy to share the results of my study with your organization.

If you are interested in helping us with this effort, please reply with names and e-mail addresses of exceptional construction leaders you would like to nominate for this project. Questions are welcome.

We look forward to your assistance,
Enrique Cabrera-Caban
Dr. Konstantin Cigularov
Old Dominion University

**3. Construction Leader Nomination E-mail for Construction Organizations in Engineering News-Record's 2014 Top 400 Construction Firms**

Hello,

We are researchers from Old Dominion University (Norfolk, VA) working on a project to find out which leadership skills are most critical for being an **exceptional first-line foreman** in construction.
We are looking for nominations of exceptional construction leaders who will participate in a 15-minute online survey where they will be shown a series of leadership skills and asked to provide their opinions on the relevance and importance of each skill. To be nominated, leaders should have extensive work experience as a foreman or supervising foremen.
If you are interested in helping us, please reply with e-mail addresses of exceptional construction leaders you would like to nominate. Self-nominations and questions are welcome.
Additionally, please forward this to anyone who you believe may be interested in assisting us.
**Common questions:**

1. **Will the survey be confidential?** Yes, we are only collecting e-mail addresses in order to contact nominees. No identifying information will be collected in the survey. The survey is completely anonymous.
2. **Who will have access to this information?** Only the researchers will have access to the survey data. Aggregate data will be reported at construction and safety-related conferences and may be published in construction research journals. No individual responses will be published.
3. **Who is your intended audience?** Both construction researchers and professionals, who may benefit from a clearly defined list of effective foremen competencies for training, performance, and defining the job.
4. **Are you working with any other associations, groups, or universities?** No. This research was initiated by faculty at Old Dominion University.

We look forward to your assistance,
Enrique Cabrera-Caban
Dr. Konstantin Cigularov
Old Dominion University
Safety Management and Applied Research Team Website

**4. Construction Leader Survey Invitation E-mail**

Subject: Invitation for Mr. X – Improving Construction Leadership Project

Hello,

We are researchers from Old Dominion University (Norfolk, VA) working on a project to find out which leadership skills are most critical for being an exceptional first-line foreman in construction. You have been nominated to participate because you were considered an exceptional leader in construction.

We are asking you to help us by completing an anonymous 15-minute survey where you will be shown a series of leadership skills and asked to rate how relevant and how important each skill is for being an exceptional first-line foreman. In exchange for your participation, we would be happy to share the results of the project with you.

The survey can be taken here: https://odu.co1.qualtrics.com/SE/?SID=SV_0c5Q5HzOA5bGyJD before June 8, 2015.

Feel free to reply to this e-mail with any questions. We look forward to hearing your opinion as an exceptional leader!

Enrique Cabrera-Caban
Dr. Konstantin Cigularov
Old Dominion University

## APPENDIX E

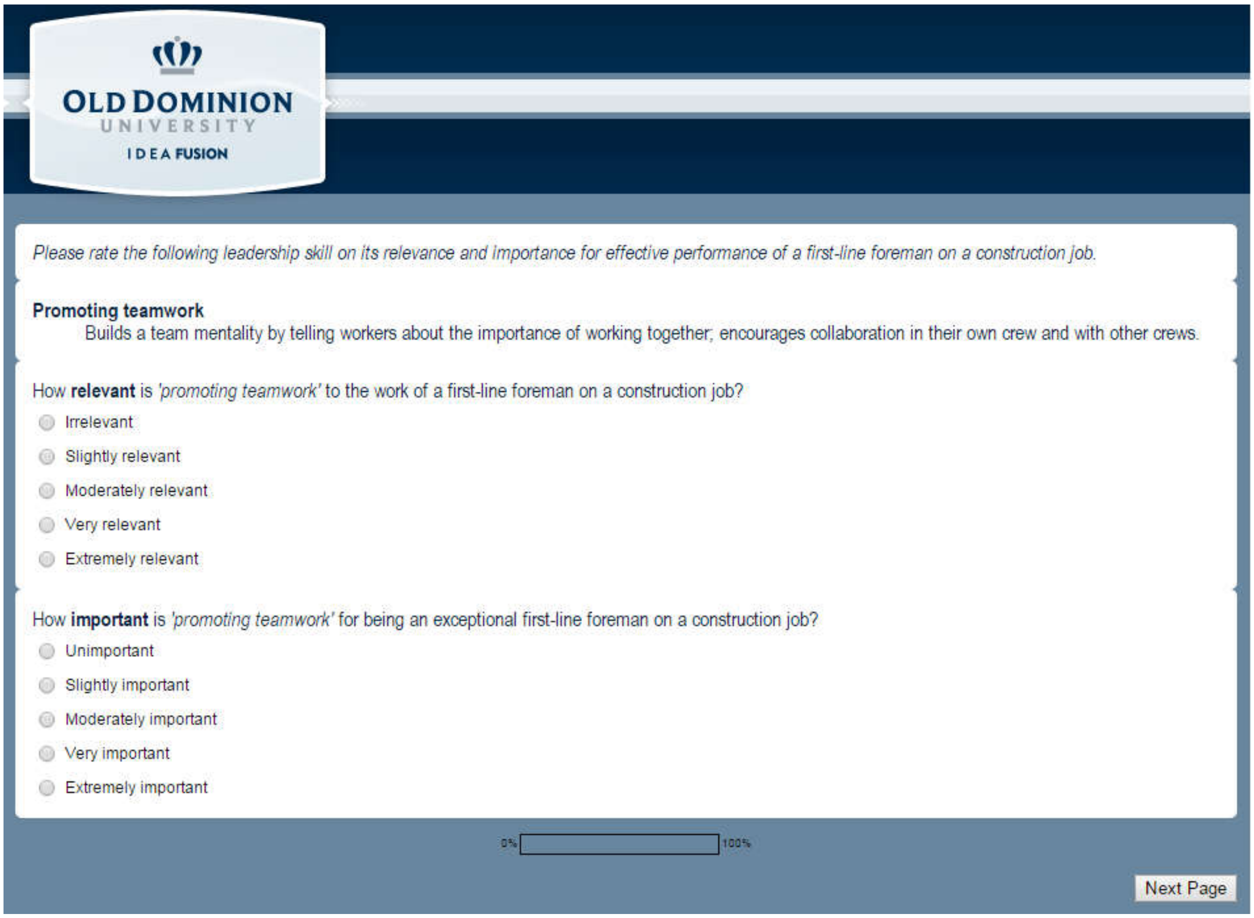
## CONSTRUCTION LEADER ONLINE SURVEY

Please rate the following leadership skill on its relevance and importance for effective performance of a first-line foreman on a construction job.

| Category | Operational Definition |
|---|---|
| Solving problems | Addresses the most important problems, provides multiple solutions, and implements the best solution. |
| Managing interpersonal conflict | Resolves conflicts between workers promptly and without taking sides. |
| Managing change and emergencies | Acts decisively during emergencies; adapts quickly to changes. |
| Regulating emotions | Shows emotions that are appropriate to the situation; remains calm under stress. |
| Building and maintaining relationships | Builds relationships with workers by getting to know them individually. |
| Promoting teamwork | Builds a team mentality by telling workers about the importance of working together; encourages collaboration in their own crew and with other crews. |
| Sharing project information | Gives project information and status updates to workers and bosses. |
| Communicating politely in language and tone | Speaks with workers nicely and avoids derogatory language and tones. |
| Treating workers equally | Treats workers of all levels fairly and does not show favoritism, especially when enforcing rules. |
| Treating others with respect | Speaks with and acts respectfully toward workers, other trades, and contractors. |
| Taking responsibility | Holds themselves accountable for their actions and the actions of their workers. |
| Demonstrating work integrity | Holds themselves to the same standard as workers, especially with work schedule, safety, and privileges. |
| Demonstrating effort and dedication | Arrives on time, dresses appropriately, and shows a lot of effort and pride toward their work. |
| Communicating honestly | Speaks truthfully about work issues and does not hide problems from workers or bosses. |
| Leading by example and modeling | Acts as a role model in all aspects of work and safety. |
| Teaching | Trains workers on how to do tasks, asks questions to make sure they understand, allows them to try tasks for themselves, then gives them feedback about how to improve. |
| Mentoring | Coaches workers to help them build knowledge and skills; shares knowledge about the trade. |

| | |
|---|---|
| Providing autonomy and empowerment | Shares power, lets workers design their ways of working, and does not micromanage. |
| Motivating and encouraging involvement | Motivates and energizes workers to go the extra mile; gets workers invested in their jobs and organization. |
| Encouraging upward voice and feedback | Asks and encourages workers to give suggestions, voice their concerns, and ask questions in any situation. |
| Communicating roles and expectations | Tells workers what their role is on the project and sets the level of expectation for good performance. |
| Explaining task rationale | Gives workers a reason for why they are doing a task and explains why the work needs to be done a certain way. |
| Giving direction about tasks and goals | Gives specific and clear directions about daily task and safety goals and priorities, then assigns tasks based on workers' skill level. |
| Monitoring performance | Checks in with workers throughout the day to see how the work is progressing. |
| Giving recognition | Recognizes workers' accomplishments and gives public praise when a job is done well. |
| Giving constructive feedback | Gives specific and timely feedback in private when observing a worker's unsatisfactory performance. |
| Planning and organizing projects | Plans, schedules, or coordinates construction project activities to meet deadlines. |
| Providing material support | Makes sure that equipment, materials, and safety gear inventory are stocked and ready before workers need to use them. |
| Solving safety problems | Acts quickly to correct safety problems and stops work if conditions are unsafe. |
| Monitoring and maintaining project site safety | Continuously monitors the work environment and crew activities to identify and address safety hazards before accidents and injuries happen. |
| Prioritizing safety and well-being | Makes workers' safety and health the top priority above all other project goals, including production deadlines and project costs. |
| Being approachable and available | Allows workers to come and talk to them whenever they need to; is approachable and responds to questions in a timely manner. |
| Helping out with tasks | Helps workers with challenging job tasks. |
| Providing social support | Stands up for workers and is flexible about non-work needs. |
| Innovating | Challenges norms, comes up with new ideas, and gets workers' support and involvement in thinking creatively. |
| Interacting with external parties | Builds positive relationships with other crews, management, and clients. |
| Managing labor | Determines labor requirements for dispatching workers to construction sites. |

| | |
|---|---|
| Budgeting | Prepares and submits budget estimates, progress reports, or cost tracking reports. |
| Developing and implementing project site programs | Develops or implements quality control and environmental protection programs. |


OLD DOMINION UNIVERSITY
IDEA FUSION

*Please rate the following leadership skill on its relevance and importance for effective performance of a first-line foreman on a construction job.*

**Promoting teamwork**
Builds a team mentality by telling workers about the importance of working together; encourages collaboration in their own crew and with other crews.

How **relevant** is *'promoting teamwork'* to the work of a first-line foreman on a construction job?

- Irrelevant
- Slightly relevant
- Moderately relevant
- Very relevant
- Extremely relevant

How **important** is *'promoting teamwork'* for being an exceptional first-line foreman on a construction job?

- Unimportant
- Slightly important
- Moderately important
- Very important
- Extremely important

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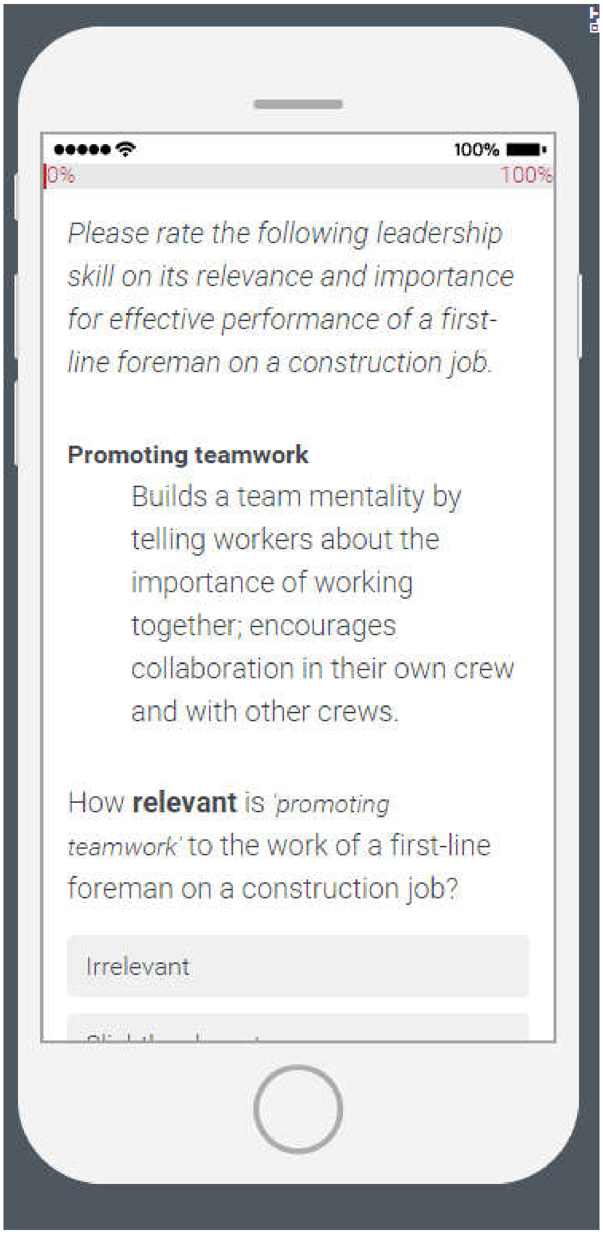
Next Page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100%
Please rate the following leadership skill on its relevance and importance for effective performance of a first-line foreman on a construction job.
Promoting teamwork
Builds a team mentality by telling workers about the importance of working together; encourages collaboration in their own crew and with other crews.
How relevant is 'promoting teamwork' to the work of a first-line foreman on a construction job?
Irrelevant

**VITA**

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## Education

Doctor of Philosophy
*Industrial and Organizational Psychology*
Old Dominion University, anticipated December 2018

Master of Science
*Experimental Psychology*
GPA 3.60
Thesis: *A Taxonomy of Effective Leader Behaviors in the Construction Industry*
Old Dominion University, anticipated August 2016

Bachelor of Science
*Psychology*
Seattle University, June 2010

## PUBLICATIONS

Cabrera-Caban, E., Garden, R., White, A., & Reynoldson, K. (in press). *Mindfulness-based interventions: A brief review of their application to graduate student strain.* The Industrial-Organizational Psychologist 54(*4*).

## CONFERENCE PRESENTATIONS

Brown, S., Cigularov, K. P., Cabrera-Caban, E., Cigularova, D. K, Myers, D. (April, 2016). A*cademic performance, help seeking, and demographics of college transfer students*. Poster paper accepted for presentation at the Virginia Association for Psychological Science; Convention, Newport News, VA.

Cabrera-Caban, E., Cigularov, K. P., & Kaufman, B. (2015, May). *A taxonomy of effective leader behaviors in construction.* In G. Sawhney & K. P. Cigularov (Co-chairs), Examining the role of safety-specific leadership in the workplace. Symposium paper presented at the 11th International Conference on Occupational Stress and Health, Atlanta, GA.

Scott, M.J., Vensland, K., Davis, J., Kaufman, B., Cabrera-Caban, E., & Bass, B. (2015, April). *A taxonomy of college student stressors and their relationships with student strains and success*. Poster presented at the annual L. Starling Reid Undergraduate Psychology Conference, Charlottesville, VA.