CONTRACTOR SAFETY PREQUALIFICATION

Background, Current Practice & New Paths

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GREAT BENEFITS CAN BE REALIZED by utilizing contractors rather than solely relying on internal resources to affect needed projects or tasks. Outsourcing allows an organization to reduce costs by maintaining a minimum workforce while allowing it to focus on its core business, promoting specialization within both the hiring and contracted company (Kozlovská & Struková, 2013; Yemenu & McCartin, 2010). Manu et al. (2013) specifically describe the benefits of contracting as including labor flexibility, transference of high-risk activities or financial risk, bargaining ability, and avoiding workers' compensation costs. Contracting projects and services involves significant hazard and operational risk as well as benefit, however (Elliott, 2017).

Evidence of serious incidents associated with the use of contractors is abundant (Cox, 2014; "Explosion Highlights Need for Careful Selection of Contractor," 2012; Fehrenbacher, 2013; Hennigan & Vartabedian, 2015; OSHA, 2015; Silver, 2015). The Bureau of Labor Statistics (BLS, 2018) reports that construction, an industry composed essentially entirely of contract workforces, nominally accounts for 1,000 fatalities per year in the U.S., or nearly three per day. BLS further reports that falls, pedestrian vehicular incident, struck by object, electrocution and nonroadway incidents are the greatest fatality types, and finally, that 621 independent workers died in 2018, or approximately 20% of all workplace fatalities if transportation related fatalities are excluded. Contractors are observed to demonstrate greater fatality rates than their host or hiring organizations (Pegula, 2014).

KEY TAKEAWAYS
- Hiring companies routinely require prospective and established contractors to submit information to demonstrate their ability and likelihood of completing incident-free work.
- Challenges that undermine the contractor safety prequalification process are observable, however, including criteria selection, efficacy, variability and ignored criteria.
- This article discusses examples of nontraditional criteria that may have significant benefit for improved contractor safety prequalification.

Contractors with high employee turnover as well as smaller contractors and those experiencing growth may be at greater risk of incident (Hinze & Gambatese, 2003). The nonroutine nature of contractor activities is a significant factor influencing major injury incidents (Manuele, 2008); this includes work in new or changing environments in which higher risk tasks are performed, and frequently by those with inadequate experience or training. Higher workloads with demands for high quality but in a limited time and for limited money are additional factors, along with conflicting goals; lack of common methods; role ambiguity; and inadequate planning, safety measures, training and subcontractor selection (Inouye, 2015; Nunes, 2012). Differences in employment relationships, cultural and linguistic barriers, supervision, and communication lines also can be problematic (Nunes, 2012). Toole (2002) studied construction incidents in the U.S. and identified seven factors related to injuries and fatalities: training, deficient enforcement of training, lack of proper safety equipment, task sequencing, unsafe site conditions, not using safety equipment and poor worker attitude. Perhaps these are among the reasons control over outsourced functions and processes are prominently discussed in ISO 45001, Occupational Health and Safety Management Systems, including the "ability of the external organization to meet the organization's [occupational health and safety] management system requirements" (ISO, 2018, p. 35).

A Solution?

In 2014, the National Safety Council's Campbell Institute gathered environmental, safety and health professionals representing diverse general industry (nonconstruction) companies to identify gaps in contractor safety management, collect contractor safety best practices, and determine challenges in evaluating and monitoring contractor safety (Inouye, 2015). The report recognized five components to

RAPEEPAT PORNSIPAK/ISTOCK/GETTY IMAGES PLUS the contractor safety life cycle: prequalification; prejob task and risk assessment; contractor training and orientation; monitoring of job; and post evaluation (Figure 1). But prequalification activities have particularly enjoyed increased and widespread devotion in recent years. Prequalification attempts to match contractor and host employer expectations and raise the standard of contractor safety performance over time (Philips & Waitzman, 2013).

The current emphasis given to contractor safety prequalification in the U.S. may trace its roots to OSHA's (1992) process safety management standard, 29 CFR 1910.119 (H)(2)(i). The standard was promulgated following the 1989 Chevron Phillips explosion in Pasadena, TX, in which a contractor had experienced a fatality at that same site within the prior year and was integral to the subsequent disaster sequence (Molinaro, 2004); 23 employees were killed and 314 were injured following the massive release and ignition of a highly flammable gas.

OSHA thereafter commissioned a study to understand the prevalence and trends of contracted work, the motivation for using contract workers, the role of safety in their selection, safety training received by contract workers, the responsibility for contract worker safety oversight, and contract worker injury and illness experience (Kochan et al., 1992). Significant reported findings were that direct-hire employees were older, more educated and experienced, paid higher, and had a stronger command of the English language than contract workers. Forty percent of hiring company respondents did not include safety as part of their contractor selection process. Roughly half of all contract workers did not receive industry-specific or prework off-site training by their employer. Site-specific contractor injury and illness data were not collected by the majority of hiring plant managers. Interestingly, contract employees had a lower incident probability when supervised by the host plant than those supervised by their contractor employer. In short, the report shed considerable light on weaknesses in the contractor supply chain.

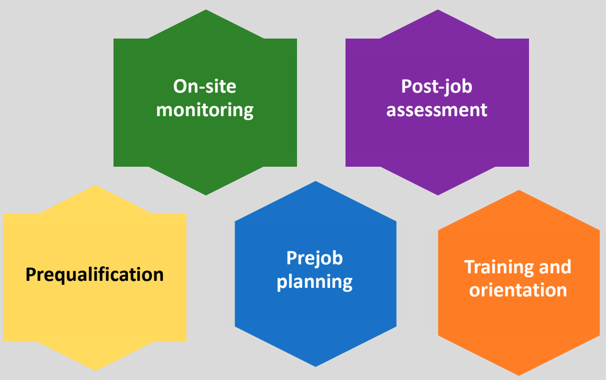
Formalized contractor safety prequalification in the U.S. therein was born, certainly so for process industries because employers with affected processes were thereafter required to obtain and evaluate information regarding safety performance and programs when selecting a contractor (OSHA, 1992). This has transpired more recently beyond process industries (Inouye, 2015; ISN, 2014; Philips & Waitzman, 2013). Indeed, publicly traded companies are now found to utilize contractor prequalification as evidence to assure stockholders (Burroughs, 2015). For example, the Edison Electric Institute has developed its industry-wide contractor safety program for contractors that build and maintain electric generation, transmission and distribution facilities; its goal is to develop a comprehensive, nationwide database for utilities to make better contractor safety decisions (Cauchon, 2014). ConstructSecure has been introduced in the construction industry as a balanced scorecard combining safety performance metrics to allow general contractor project managers to evaluate bidding companies before work is awarded (Sparer et al., 2013). Models for contractor prequalification are also found abroad. In the 1990s, the Dutch petrochemical industry introduced VCA (Nunes, 2012); translated, the acronym stands for a safety, health and environmental qualification system. It relies on detailed questionnaires to assess prospective contractors' OSH working practices. Successful contractors are issued a certificate and thus are provided entry to perform high-risk work (e.g., construction, maintenance, industrial cleaning). Unsuccessful contractors are excluded.

Expected Benefits

ANSI/ASSP Z10.0-2019 states, "it is known that organizations with prequalification programs tend to see better OSH performance from contracted organizations" (p. 47). Supporting are Abbaspour et al. (2012), who recognize the particular importance of understanding the compatibility between a company's safety, health and environmental management systems with that of its contractors and their subcontractors. They

FIGURE 1

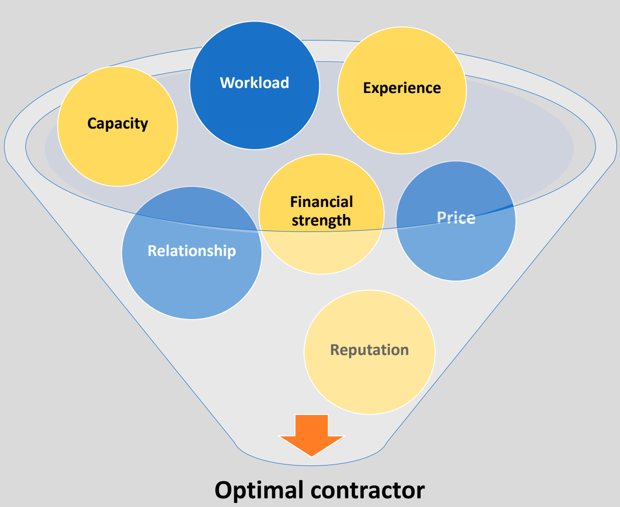
FIVE COMPONENTS TO THE CONTRACTOR SAFETY LIFE CYCLE



Note. Adapted from "Best Practices in Contractor Management," by J. Inouye, 2015, p. 5, Campbell Institute, National Safety Council.

FIGURE 2

SELECTING THE OPTIMAL CONTRACTOR



Note. Adapted from "Final Contractor Selection Using the Analytical Hierarchy Process," by P.S.-W. Fong and S.K.-Y. Choi, 2000, *Construction Management and Economics, 18*(5), p. 552.

If it is accepted that there are significant benefits to contractor safety prequalification, it also must be accepted that there are significant challenges to doing it well.

developed an extensive assessment system based on Shewhart's ideas on quality (i.e., plan, do, check, act; Sliwa & Wilcox, 2008). The operative theory is that hiring companies, via prequalification, are positioned to positively influence contractor safety and health performance by doing so upstream of the contractor's work being awarded or begun since contractors are likely to react to owners who apply nonprice criteria (Waara & Brochner, 2006). Many believe that selecting a contractor with a history of good safety performance provides assurance of future safety performance; selecting a contractor with poor safety performance portends the opposite (Kozlovská & Struková, 2013). Echoing are Yemenu and McCartin (2010), who consider contractor prequalification to be a fundamental aspect of "actively managing" contractors (i.e., a process they conclude produces lower contractor incident rates than reported by their peers). Moreover, improvement to loss rates may be promoted since hiring companies have the ability to establish baselines from which the progress toward lower rates may be monitored year after year (ISN, 2014).

Not So Fast

If it is accepted that there are significant benefits to contractor safety prequalification, it also must be accepted that there are significant challenges to doing it well. Variables potentially adversely influencing the acceptance or rejection of contractors include selection criteria, efficacy, evaluation variability and ignored (nonsafety) criteria.

Criteria

ANSI/ASSP's Z10.0-2019, for example, encourages a vetting process for contractors and service providers to examine numerous OSH factors, including injury and loss experience and programs to control risk (p. 47). The wide use of those specific metrics was confirmed by the Campbell Institute (Inouye, 2015) and others (Abu Nemeh, 2012; Hatush & Skitmore, 1997a). The most commonly encountered safety criteria during an extensive literature review were contractor injury history, contractor employee training, liability and regulatory history, and written safety programs (Wilbanks, 2017).

Philips and Waltzman (2013) produced an extensive summary and critique of contractor safety prequalification practices and recognized the disparity in selection criteria employed by individual operating units, cross-company criteria and also criteria facilitated by third-party evaluation companies. They conclude that imposing criteria "separates the wheat from the chaff," but they do not specify which criteria is best. They acknowledge subjective criterion such as a contractor's safety culture as an important indicator of future performance but admit such data can be costly and challenging to collect and evaluate. Thus, there is a tradeoff between the subjective and the more readily measured objective criteria. Problematic to overreliance on objective criteria, say Philips and Waltzman (2013), is that it "tries to be such that all can agree whether the criterion was met or not. But the narrowness of objectivity can possibly mean that the criterion is not measuring what the system hopes it is measuring" (pp. 25-26). The principal risk is that binary "yes" or "no" criteria, while logical and efficient, might allow a good contractor to be disqualified (Ali, 2005; Holt, 1998) and, reciprocally, a bad contractor to be qualified. A better understanding of a contractor's strength of relationships, communication, integrity, fairness, professionalism, creativity and innovation would provide a more humane prequalification system, perhaps more capable of separating the wheat from the chaff (Baroudi & Metcalfe, 2011).

Singh and Tiong (2006) argue that contractors do not believe it is appropriate to generalize decision criteria to all projects. But Hatush and Skitmore (1997a) conclude that development of a standardized criteria for contractor selection is achievable, and with it a quantified selection framework for "accurate, reliable and efficient decision making" (i.e., efficacy; p. 37). Which conclusion is correct?

When determining selection criteria, whether generically prescribed or project specific, Janicak (2010) provides helpful questions worth asking:

- Is the data readily available?
- How accurate is the data?
- Is the data easily understandable?
- Is the data a true measure of the indicator or could there be biases?
- Could there be reliability issues with the data? (p. 30).

Efficacy

Yemenu and McCartin (2010) found that prequalification efficacy is important simply because of the administrative burden imposed on both the hiring organization and the prospective contractor. Administrative processes are required, personnel must devote time to attending them, and duplicative and inconsistent efforts can create delay and inaccurate evaluations. The authors believe that this problem is magnified by the lack of standardization of selection criteria across all hiring companies and industries, yielding that contractors must conform to a myriad of hiring client demands. The range of qualification criteria can be merely the verification of insurance to integrated audits with complex grading systems (Baghdassarian, 1999; Jennings & Holt, 1998). When examined, the demand by hiring companies for numerous written programs and self-reported loss rates from established or prospective contractors greatly fail basic validity and reliability tests requisite for scientific inquiry (Wilbanks, 2018; 2019).

Evaluation Variability

Mahdi et al. (2002) found that selection methods are often dependent on the skill, experience and knowledge of the individuals evaluating contractors. Time pressures to complete the prequalification procedure may further result in incomplete and inaccurate conclusions when there is a lack of information and shortcomings in the assessor's competence (El-Sawalhi et al., 2007). This means consistency naturally varies due to subjective judgments derived from one evaluator to the next, and it is a worry, along with fairness, voiced by some contractors (Baroudi & Metcalfe, 2011; National Academies of Sciences, Engineering and Medicine, 2009). This worry is possibly less problematic when objective data are compared to stringently obeyed specified limits (e.g., requiring prospective contractors to achieve a days away, restricted or transferred rate of less than 2.0 using a 100-worker rate basis). But given a hypothetical example of a submitted incident rate of 2.01, is it reasonable to ask whether the contractor should be given the benefit of the doubt or strictly held to the agreed standard without further consideration? Individual factors of evaluator knowledge, skill and experience are thereby magnified.

Given the preceding, more problematic may be intra-evaluator judgments about the adequacy of nonquantified data, for example, contractor policy and written compliance programs in which a wide variety of format, content and requirements, relevance, and their current review and update may be found. El-Sawalhi et al. (2007) might describe this as "noisy and uncertain data."

Ignored Criteria

Nonsafety criteria is frequently applied for the selection of primary or general contractors in large projects (Figure 2, p. 32) but is infrequently applied for contractor safety prequalification, whether facilitated by third-party vendors or hiring organizations (Fong & Choi, 2000).

Hinze and Gambatese (2003) studied the impact of employee attrition within construction industry specialty contractors and conclude that higher turnover rates are associated with higher injury rates, a factor not commonly encountered in contractor safety prequalification schemes. Others are management ability, adaptability and coordination, and current resources and workloads (Mahdi et al., 2002). Nunes (2012) recognizes cooperation and long-term relationships as important factors for promoting OSH. Jennings and Holt (1998) evaluated construction contractor perceptions of selection criteria and found that prior relationships were rated as one of the top five important factors, beaten only by price, experience, reputation and financial standing. Other factors not found in general industry contractor safety prequalification are planning, depth of experience, external certifications, people, quality and technical expertise (Doloi, 2009; Egwunatum et al., 2012; Hatush & Skitmore, 1997a; Singh & Tiong, 2006; Waara & Brochner, 2006; Xinyu & Hinze, 2006).

Expanded Criteria

The criteria additionally recommended for OSH professionals' contractor prequalification consideration are capacity, experience, financial stability and reputation. Each are summarized as possibilities for improving contractor safety prequalification utility, that is, selecting safer contractors.

Capacity

Capacity is the current position of the contractor to perform the proposed project and broadly includes management ability, adaptability and coordination, and current resources and workloads (Mahdi et al., 2002). Capacity can be overlooked in preference to financial qualifications, given the incorrect assumption that capacity rises and falls proportionately with workload (Palaneeswaran & Kumaraswamy, 1999). Bakheet (1995) provides a general context for the term's common usage through alliteration: machines, manpower, materials, money and management. A more extensive delineation can be incorporated into a rating scheme resulting in conclusions of capacity risk (Figure 3). Lack of labor availability, equipment, construction materials, key technical resources and experienced personnel increase project risk.

Perhaps one of the starkest examples of increased risk from inadequate capacity can be found in the May 11, 1996, crash of ValuJet flight 592 in the Florida Everglades, which resulted in the loss of life of 110 passengers and crew. Matthews and Kauzlarich (2000) say that ValuJet was a rapidly growing start-up airline, operating just two planes initially and securing a total of 50 aircraft within its first 31 months of operation; the crash happened in the airline's fourth year of existence. The company's motto was "lean and mean" and it relied heavily on outsourcing. Central to the crash was the company's maintenance contractor, SabreTech, which was found to be directly culpable. Multiple shortcomings were identified by the Federal Aviation Administration in ValuJet's contractor monitoring, with specific concerns about SabreTech, including inadequate tools and materials for the work assigned to it by ValuJet as well as the unavailability of adequate repair manuals (Major, 1996; "Sabretech shuts down airline repair shop," 1997). Performance pressure and contract penalties imposed by ValuJet on SabreTech may have indirectly contributed to SabreTech's falsification of records (Matthews & Kauzlarich, 2000). It is clear that both companies lacked adequate capacity for the achievement of their respective objectives.

A less dramatic but equally compelling example of the relationship between capacity and incidents is offered by Elenge et al. (2013). They empirically found high levels of incidents exacted upon artisanal mining workers in the Congo. More than 72% of the 180 workers surveyed had incurred a workplace incident in the prior 12 months; 60% had experienced more than two incidents in the same period. The unsuitability of tools was found to be one of the major causes of incident, as was lack of experience and the absence of an adequate apprenticeship program or effective training generally. Each are examples of inadequate capacity.

Contractor safety prequalification schemes are not found to include evaluations of capacity. Note that the average number of full-time workers per establishment in the U.S. over a recent 18-year period was approximately 16, and the average size of a firm (that could contain multiple establishments) was approximately 22 workers, and smaller contractors and those experiencing growth may be at greater risk of incident (Choi & Spletzer, 2012; Hinze & Gambatese, 2003). The study of capacity in the context of contractor safety prequalification appears to be a rational factor to consider.

Experience

Mahdi et al. (2002) included contractor experience as one factor when proposing a multiple-criteria decision support system as a method for selecting risk optimal construction contractors. Mahdi describes experience as including such things as:

- number of years working on similar projects,
- total work volume on similar projects,
- average work volume on similar projects,

•working in similar geographical conditions, and
•working in similar weather conditions in similar projects.

Doloi (2009) further includes retention of key (experienced) personnel and conducted a study that ultimately identified seven selection factors with subattributes using factor analysis for use in contractor prequalification for construction projects. Four of those factors included experience-related subattributes: technical expertise, successful past projects, knowledge of regulations, overall and similar work experience, and time in the business. A regression analysis of each subattribute was conducted using the seven identified factors versus the dependent variables of time, cost and quality—requirements subsequently recognized by Alzahrani and Emsley (2013) as the "iron triangle" of contractor performance. Figure 4 illustrates the significant correlations discovered. Experience-related characteristics are highlighted in bold.

However defined, contractor experience is inextricably linked to the likelihood of a contractor performing on time, to budget and to the quality required. Doloi's (2009) conclusions are broadly supported by prior and subsequent research as well, demonstrating the criticality of experience as a significant prequalification factor (Ebrahimi et al., 2016; Egwunatum et al., 2012; Hatush & Skitmore, 1997b; Jennings & Holt, 1998; Watt et al., 2010). However, contractor experience is not found to be routinely tested within general industry safety prequalification schemes, whether internally facilitated or by a third-party service. This is ironic because the relationship between worker experience, a microview of organization experience and incident frequency has been convincingly demonstrated in numerous environments (Fabiano et al., 2008, 2010; Hintikka, 2011; Takeuchi, 2011), making clear that contractor experience is highly correlated with the ability to safely complete contracted work.

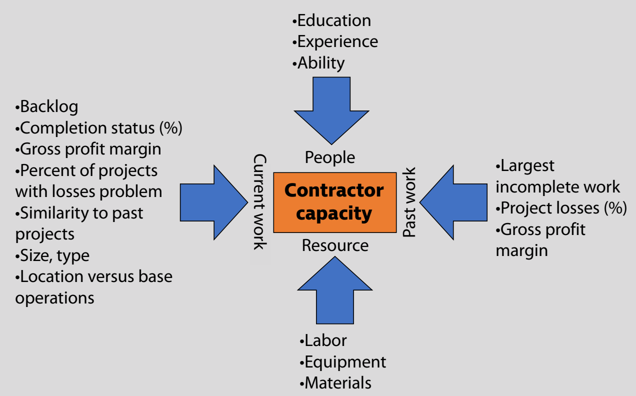
Financial Stability

Contractor financial stability may be the most basic test of whether contractors can do what is promised by them, hence its centerpiece prominence in general contractor prequalification systems (Abu Nemeh, 2012; Cheng & Heng, 2004; Doloi, 2009; Ebrahimi et al., 2016; Hatush & Skitmore, 1997a, 1997b; Mahdi et al., 2002; National Academies of Sciences, Engineering and Medicine, 2009). Bakheet (1995) recognizes financial stability (or capital) as one of the four C's relied upon by underwriters when assessing contractor bond applicants (i.e., character, capital, capacity, continuity) and provides a template for assessing contractor financial stability that includes quantitative and qualitative financial measures.

Singh and Tiong (2006) studied 48 contractor selection factors in the Singapore construction sector and produced priority rankings for likelihood of successful project completion. Current financial commitments and liquidity were ranked third and eighth respectively. Contractors themselves have placed similar importance of financial stability for winning work (Jennings & Holt, 1998). The term "financial stability" is broadly interpreted to include subfactors such as financial longevity; ability to meet short- and long-term debt; credit level and payment history to suppliers and contractors; financial statement quality; and liquidity, operations and leverage ratios (Mahdi et al., 2002). It is posited that such factors may be inferential to a contractor's safety capabilities.

Truit (2012) advises contractor financial stability should be considered for safety and health reasons, as cash-starved contractors or those having a high debt-to-equity ratio may not be able to invest in the desired programs, training and equipment. Generally supporting this hypothesis are Hatush and Skitmore (1997a), who recognized the importance of financial stability as inferential to understanding whether the prospective contractor has the minimum resources required to meet contract demands: credit status, bank status, bond status and published account reports. Specifically reinforcing this premise are Dionne et al. (1997), who conducted a detailed study of the financial stability of airlines and their management's decisions. A database was compiled including a large number of incidents, carriers and financial structures coupled with maintenance and safety investment histories.

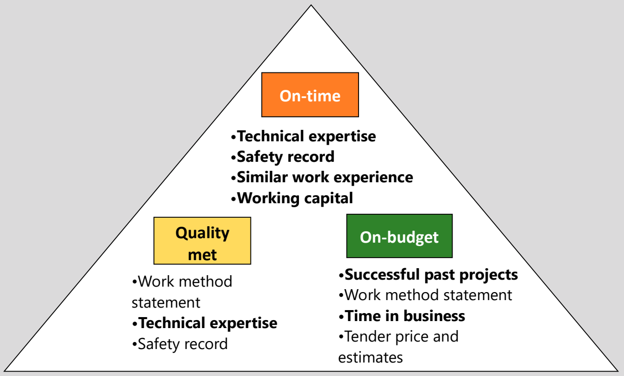
FIGURE 3
CONTRACTOR CAPACITY



Note. Adapted from "Contractors' Risk Assessment System," by M.T. Bakheet, 1995, Georgia Institute of Technology, Table 16, p. 157, ProQuest Dissertations and Theses Global.

FIGURE 4
IRON TRIANGLE & IMPORTANCE OF EXPERIENCE

The "iron triangle" of contractor performance: time, cost and quality (Alzahrani & Emsley, 2013). Experience-related characteristics are highlighted in bold.



Note. Adapted from "Analysis of Prequalification Criteria in Contractor Selection and Their Impacts on Project Success," by H. Doloi, 2009, *Construction Management and Economics, 27*(12), Table 7, p. 1258.

Poisson models of incidents were estimated and evaluated using dispersion tests. Debt-to-equity ratio and maintenance investment were shown to have statistically significant effects on incident frequency. Importantly, negative debt-to-equity financial condition affected manager decision-making negatively, whereas its opposite affected decision-making positively. Financial realities can affect safety choices and, thus, create moral hazards. Wang et al. (2013) found an inverse relationship between greater safety investment and decreased likelihood of incident [i.e., "airlines can increase their level of safety by spending more on maintenance and training" (p. 31)]. The ability to invest in safety, intuitively, is dependent upon cash availability.

Pilateris and McCabe (2003) admit that challenging to the hiring organization is that contractors are most often privately held companies and are not subject to the accounting and reporting practices of publicly held entities. This prompted the authors to develop and test their contractor financial evaluation model. Data envelopment analysis was used to produce efficiency scores yielding financial benchmarks that contractors could pursue and also be compared against. Reductions to the contractors' efficiency score were correlated to increasing accounts receivable and payables, debt to equity, fixed assets to equity, gross profits to sales, administrative expenses, and also to decreasing net income versus sales and equity. Their work demonstrates that it is possible to rank the financial stability of privately held contractor firms versus their peers. This coupled with the posited relationship between financial stability and a contractor's safety investment ability provides ample basis to promote financial stability as a basic contractor safety selection factor worthy of study.

The product of contractor safety prequalification, at its essence, is discerning which, among all possible choices, provides the greatest confidence that the project will be completed successfully.

Reputation

Reputation is a factor commonly incorporated into the selection of large project primary or general construction contractors, an industry that persistently experiences high injury and illness rates (Jennings & Holt, 1998; Kozlovská & Struková, 2013; Rajendran, 2013). Lewis (2001) describes reputation as an asset allowing companies to charge a premium (or not) for their products and services [i.e., a positive reputation provides competitive advantage and, thus, is an asset of "immense value" (p. 31)]. The author further describes the complexity of how reputations are earned as a "fermenting mix of behavior, communication and expectation" (p. 31). But reputation for primary contractors undertaking large projects is an important prequalification factor moreover because failure of the contractor to perform generally can lead to excessive losses, project delays and unacceptable quality (Movahedian Attar et al., 2013). Thus, reputation connotes more than a safety risk, but more broadly a prospective contractor's likelihood of completing the iron triangle (i.e., on time, under budget and to specifications; Alzahrani & Emsley, 2013). This is evidenced, for example, by Jennings and Holt (1998), who solicited regional, national and international contractors' perceived level of importance of 15 selection factors and found that reputation was considered the third most important (0.75); only price (0.89) and experience (0.77) were thought to be more important.

Singh and Tiong (2006) studied past contractor performance along with other factors and identified subcategories, all of which were inferential to reputation: relationship with subcontractors, suppliers, regulating authorities, and past project owners; correcting faulty work; completion on schedule; quality; and others. Reputation, therefore, is a measure of success. Doloi (2009) opines that it is too often subjectively assessed by hiring organizations. This is consistent with the Campbell Institute's observation among surveyed companies regarding their contractor safety prequalification practices [i.e., there is a lack of post job completion contractor evaluation that logically would test reputation or past performance (Inouye, 2015)]. Perhaps this reveals a gap for safety practitioners to more fully explore when qualifying contractors. As noted by Yemenu and McCartin (2010), "Companies need to have full visibility to how hired contractors have performed in the past and are performing at present," a challenging but not impossible undertaking. The following factors are illustrative of readily available data that would be highly inferential to measuring contractor safety reputation:

- adherence to defined safety practices
- use of safety equipment (PPE, ladders, etc.)
- reporting of workplace hazards, unsafe acts, conditions and equipment
- offering suggestions or solutions to safety problems or concerns
- planning of work to include checking safety of equipment and procedures before starting work
- immediately reporting of illness or injury potentially arising from the job
- providing support to safety programs
- providing workplace job, task, equipment, tool or position hazard assessments for annual review by employees on hazards unique to their job assignments
- providing orientation to new employees on safety requirements before beginning work (combination of formal training, online and on-the-job training)
- clearly informing employees of unsafe conditions and safety hazards
- consistently and effectively enforcing the safety program, including disciplinary actions (required by Cal/OSHA) for employees who violate safety requirements
- ensuring by observation that employees have work experience before they are allowed to perform hazardous operations on their own
- ensuring rapid correction of identified safety hazards through adoption of interim solutions and permanent corrections
- providing early return-to-work opportunities and ensuring compliance with medical limitations (UCDavis Safety Services, 2020, para 2-3)

Periodic evaluation of select performance criteria is recommended. Numeric weightings could be applied to provide quantifiable performance comparisons.

The product of contractor safety prequalification, at its essence, is discerning which, among all possible choices, provides the greatest confidence that the project will be completed successfully (Movahedian Attar et al., 2013). In the context of contractor safety prequalification, success is the absence of incident and undue attention from regulators, and the question of contractor reputation is not fully resolved by a review of submitted losses or written programs (Burroughs, 2015). Ancient advice stresses that one should "walk with the wise and become wise, for a companion of fools suffers harm" (Biblica, 2011). Assessing contractor reputation as part of a comprehensive safety selection criteria may be an important avenue for hiring organizations to walk with the wise.

Conclusion

Four measures have been introduced that are not commonly incorporated into contractor safety prequalification processes for service, maintenance and repair contractors, but they could be. OSH professionals are encouraged to look past the current paradigm of written safety programs and self-reported loss rates, the utility of which has been discounted (Wilbanks, 2017, 2018, 2019). Prequalification is an important component of an overall contractor safety process. Yet the methods currently employed are found wanting when significant improvement is possible. Admittedly, contractor capacity, experience, financial strength and reputation are not traditionally within the OSH professional's area of expertise or perhaps even interest. It is hoped that the discussion herein proves, however, that there are legitimate areas of nontraditional inquiry that are underutilized and strongly inferential to better contractor selection choices. **PSJ**

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