WORKFORCE CHALLENGES AND STRATEGIES OF TOP CONTRACTORS IN THE UNITED STATES

Bassam Ramadan1, Hala Nassereddine2, Timothy Taylor3

1 University of Kentucky, Lexington, KY, USA
2 University of Kentucky, Lexington KY, USA
3 NCCER, Lexington, KY, USA

Abstract
The construction industry is plagued with numerous workforce challenges. The skilled craft labor shortage has been a consistent and unfortunate recurring struggle for the past three decades. Moreover, recent trends show that the construction workforce has been aging rapidly, aggravating the labor shortage challenge and negatively impacting project performance in terms of cost, schedule, and safety. Studies in the existing literature have highlighted the different workforce challenges and strategies to address them and mitigate their impact, mostly from a research perspective. However, no research has yet studied how top contractors in the United States are dealing with these workforce issues. The purpose of this study is to analyze the challenges the top contractors in America face and synthesize the strategies they employ to address these challenges and increase workforce performance. To achieve the research objective, the authors analyzed recent annual reports of top contractors and summarized the challenges they face and the policies and strategies they have institutionalized to respond to current challenges.

1. Introduction and Background
The US construction industry stands at a crossroads. The United States infrastructure is deteriorating and is in dire need of replacement as we continue to face a major shortage in the labor force [1]. The construction industry struggles with plenty of workforce challenges. The skilled craft labor shortage has been an unfortunately recurring challenge for the past few decades [2]. Moreover, recent data trends show that the construction workforce has been rapidly aging, exasperating the labor shortage challenge and negatively impacting project performance in terms of safety, schedule, and cost [3]. To add, the construction industry suffers from a lack of workforce diversity, especially gender diversity, where women make up less than 4% of the construction craft workforce in the United States [4]. Despite this small female participation percentage, the construction industry faces major struggles relating to the treatment of women in the construction industry. One recent study concluded that women in construction are more likely, on average to feel disrespected at work, be subjected to derogatory remarks, and be treated unprofessionally [5]. Moreover, the construction industry has failed to consistently attract and retain skilled workers due to the negative industry image problems, an aging workforce, and insufficient training [6]. Furthermore, the industry continues to suffer from inadequate frontline supervision and failure of frontline supervisors to provide the necessary information, planning, support, and motivation [7], especially as frontline supervisors have the essential responsibility of ensuring safe and healthy work practices, and they create the missing communication link between the craft workforce and management [8], [9]. Several research efforts have extensively highlighted the importance and major influence frontline supervisors have on construction productivity [10]–[12].

There is an apparent consensus by industry leaders and experts that the construction industry will look radically different over the next 20 years [13]. With the increasing level of sophistication in the construction industry, construction companies are turning to unique and innovative approaches to gain...
a competitive advantage [14], from increasingly adopting construction technologies [15], to increasingly using as-built models to meet the maintenance needs of the future [16], and to highlighting the need for workforce training [17].

Construction workers are the cornerstone of the construction industry, especially as they constitute a sizable segment of overall production costs. Consequently, their performance and productivity are essential to the successful completion of construction projects [18]. One major problem facing the construction industry is the drop in the rate of worker productivity and performance [19]. Because construction workers play an outsized role in overall construction productivity, it is important to understand the factors of what impacts their productivity and performance. Factors involving tools and construction equipment, materials, and technologies were found to have a major impact on worker performance [20]. For instance, a study that examined the impact of 13 types of technologies on construction workforce performance and information access found that the use of several information, material, and equipment technologies offers a statistically significant improvement of average workforce performance in the construction industry [21]. One study that analyzed the impact of administrative and computer skills of construction workers showed that such skills increase performance and information access [22]. Another study found that ethnic and gender crew diversity improves worker performance and information access in the construction industry [23]. Other determinants of workforce productivity and performance include: an increased level of supervision [24], effective communication and information flow [25], sufficient financial compensation [24], adequate work planning of construction tasks, methods, and materials [26], continuous work training and education, [24], and the effective implementation safety measures [27].

While workforce challenges in the construction industry and strategies to mitigate their impact have been thoroughly studied in existing literature, no research has yet studied the challenges the leading contractors in the United States face or the strategies they employ to address them and increase workforce performance. This study aims to analyze the challenges the top contractors in the US face and synthesize the strategies they employ to address those challenges and increase workforce performance.

2. Methodology

This study aims to analyze the challenges the top contractors in the US face and synthesize the strategies they employ to address those challenges or increase workforce performance. To achieve the research objective, the authors analyzed recent annual reports and websites of the top 10 contractors in the United States and summarized the challenges they face and the policies and strategies they have institutionalized to respond to current challenges and increase workforce performance and productivity. The authors analyzed the contents of annual reports and other available resources on their websites and highlighted those major challenges they face and policies they institute. In this study, Project-specific challenges or strategies are beyond the scope of this analysis.

The results of the analysis are represented in word clouds in Figures 1 & 2. A word cloud is a visual portrayal of word/phrase frequency in the composed text. The more often a word/phrase appears in composed text, the larger it appears in the developed image [28]. A larger font size in the graphic indicates a higher frequency of occurrence in the text or the narrative. This visualization is a helpful tool to assist investigators in evaluating textual data and highlighting words/phrases with high frequency [29].

The list of top 10 contractors used for this analysis was selected based on the list of top contractors from Engineering News-Record (ENR). ENR provides the engineering and construction news, analysis, commentary, and data that construction industry professionals need to do their jobs more effectively. Additionally, ENR reports on the top design firms, both architects and engineers, and the top construction companies and contractors as well as projects in the United States and around the world [30].

Table 1 shows the list of the top 10 ENR contractors that were analyzed [31], their year of founding, annual revenue, and references/sources used in the analysis.
Table 1: List of ENR top 10 contractors used for analysis [31]

<table>
<thead>
<tr>
<th>2022 Rank</th>
<th>Contractor</th>
<th>Year Founded</th>
<th>Revenue</th>
<th>References/Sources Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The Turner Corp.</td>
<td>1902</td>
<td>$14.4B</td>
<td>Website [32], Annual Report [33]</td>
</tr>
<tr>
<td>2</td>
<td>Bechtel</td>
<td>1898</td>
<td>$17.6B</td>
<td>Website [34], Annual Report [35]</td>
</tr>
<tr>
<td>3</td>
<td>Kiewit Corp.</td>
<td>1884</td>
<td>$13.7B</td>
<td>Website [36]</td>
</tr>
<tr>
<td>4</td>
<td>STO Building Group</td>
<td>1971</td>
<td>$8.1B</td>
<td>Website [37], Annual Report [38]</td>
</tr>
<tr>
<td>5</td>
<td>Flour</td>
<td>1912</td>
<td>$15.6B</td>
<td>Website [39], Annual Report [40]</td>
</tr>
<tr>
<td>6</td>
<td>The Whiting-Turner Contracting Company</td>
<td>1909</td>
<td>$9.2B</td>
<td>Website [41], Annual Report [42]</td>
</tr>
<tr>
<td>7</td>
<td>DPR Construction</td>
<td>1990</td>
<td>$6.8B</td>
<td>Website [43]</td>
</tr>
<tr>
<td>8</td>
<td>Skanska USA</td>
<td>1887</td>
<td>$17.2B</td>
<td>Website [44], Annual Report [45]</td>
</tr>
<tr>
<td>9</td>
<td>Clark Construction Group</td>
<td>1906</td>
<td>$5.0B</td>
<td>Website [46]</td>
</tr>
<tr>
<td>10</td>
<td>AECOM</td>
<td>1990</td>
<td>$13.3B</td>
<td>Website [47], Annual Report [48]</td>
</tr>
</tbody>
</table>

3. Results and Analysis

The results of the analysis in this study are portrayed in Figures 1 & 2. Figure 1 shows a word cloud of the major challenges top contractors face, while Figure 2 shows a word cloud of the strategies they employ to address them or increase workforce performance.

In Figure 1, we can observe a word cloud representation of the major challenges that top contractors face that they have mentioned throughout their reports and websites. As can be seen, labor shortage was the primary challenge contractors face. All of the 10 top contractors discussed labor shortage as a problem they struggle with. This is consistent with what we see across the literature in construction research as this is a problem the industry has been struggling with for decades [2]. The second biggest challenge contractors faced was having to deal with COVID-19 and its impacts. Such a challenge, which was mentioned by nine of the 10 companies, strained the workforce in addition to the skyrocketing material cost, supply-chain bottlenecks and overall industry-wide disruptions. COVID-19 presents as a major challenge as this analysis refers to reports developed for periods during the pandemic. However, it is unclear whether this will only be a temporary problem, or if COVID-19 will have other long-term impacts on the industry. Due to the labor shortage and COVID-19, companies are facing...
rising labor costs and are forced to employ workers without the sufficient amount of necessary skills to perform their jobs. All of these factors lead to a decrease in productivity and construction output. Another challenge companies mentioned was the aging workforce of the United States. Research suggests that the median age of the construction workforce is projected to rise from 42.9 in 2020 to over 46 by 2030 [1]. Moreover, two of the contractors had struggles with discrimination and harassment, and one of them was sued for racial discrimination and was forced to settle the lawsuit. This is not surprising given the nature of the workforce culture of the construction industry, especially as one study found that construction workers are more likely to be treated unprofessionally and subjected to derogatory remarks at work compared to the national workforce [5]. Furthermore, contractors are struggling to recruit and retain workers, especially in light of competition from other industries and workers deciding to retire early. Finally, immigration restrictions has been limiting the contractors’ ability to hire foreign workers as a backstop to fill the gap in the skilled labor shortage in the construction industry in the US.

Figure 2: Word cloud of strategies top contractors indicated they use to address challenges or increase performance

<table>
<thead>
<tr>
<th>Improve Supervision</th>
<th>Employee Engagement</th>
<th>Health &amp; Wellness</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Workforce Training</strong></td>
<td>Mentorship &amp; Sponsorship</td>
<td>Diversity &amp; Inclusion</td>
</tr>
<tr>
<td>Student Recruitment</td>
<td>Offsite Fabrication</td>
<td>Improve Safety</td>
</tr>
<tr>
<td>Better Benefits</td>
<td>Leadership Training</td>
<td>Better Compensation</td>
</tr>
</tbody>
</table>

In Figure 2, we can observe a word cloud representation of the major strategies that top contractors employ to address the challenges they face or improve productivity that they have mentioned throughout their reports and websites. As can be seen, increasing diversity and inclusion is one of the main policies contractors use to address their challenges, as it was mentioned by all 10 contractors. Women make up less than 4% of the construction labor force and other minority groups are underrepresented in the industry [4]. Contractors realize that women and minority groups form a well of untapped labor potential that can fill the labor shortage gap, and diversifying the workforce can help attract more women and minorities into the labor force. Additionally, contractors are hyper-focused on workforce training and development to give their workers the necessary skills to do the job, and also offering them the needed mentorship and sponsorship to guide them in their career. Moreover, contractors continue improve their safety procedures and strive for a zero-incident goal in an effort to protect their employees and create a safe working environment. Several Companies are offering their workforce leadership training to build up future leaders in their companies. Furthermore, contractors are attempting to recruit students directly out of high schools and colleges, and are directly engaging with employees to listen to their needs. Still, in an effort to retain their workforce, contractors are starting to offer better compensation and benefits, focusing on health and wellness of their workforce, streamlining the promotion process, and one is even offering stock options for workers. In order to improve productivity, one company is increasing the level of frontline supervision. Finally, because of the limited
available on-site labor, two contractors are increasingly using offsite fabrication to decrease the amount of on-site construction working hours.

4. Conclusion, Limitations, and Future Work

The construction industry continues to struggle with numerous workforce challenges. There has been a consistent skilled craft labor shortage that has been unfortunate recurring problem for the past three decades. This study aims to analyze the challenges the top 10 ENR contractors in America face and synthesize the list of strategies they employ to address those challenges or increase workforce performance. The results of the analysis show that major challenges contractors face include labor shortage, COVID-19, labor cost, unskilled labor, decreased productivity, an aging workforce, discrimination and harassment, industry competition, workforce recruitment and retention challenges, early retirement, and immigration restrictions. In an effort to address such challenges and increase workforce performance, contractors have employed several policies and strategies. Those include: increasing diversity and inclusion in the workforce, workforce training and development, improving safety procedures, offering mentorship and sponsorship, recruiting students out college and high school, offering leadership training, offering better compensation and benefits, focusing on health and wellness of the workforce, engaging with employees, improving frontline supervision practices, streamlining the promotion process, offering employees stock options, and moving to offsite fabrication.

While this study presents a content analysis of the annual reports and websites of the top 10 ENR contractors to identify the major challenges they struggle with and the strategies they use to limit the impact of those challenges and increase performance, we are limited to what the contractors write down in their reports and websites. Therefore, this analysis may not have the full scope of the issues they face, as some companies may be reticent about sharing and detailing all the problems they have. Future research can build on this study and attempt to analyze the challenges and policies of a significantly larger set of top contractors to get a better picture of the status of challenges in the construction industry, including small and medium sized contractors.

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References
