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Challenges and Opportunities to Address Diversity, Equity, and Inclusion within the Professional Construction Industry

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Abstract

The construction industry has been a predominantly White/Caucasian Men community with a low representation of Women and underrepresented minorities. Even though companies have been implementing Diversity, Equity, and Inclusion (DEI) statements for many years, the impact of those statements has not been evident, and the field is neither diverse nor equitable. The objective of this work is to gain a deeper understanding of how DEI statements declared by companies are perceived and recognized by employees. A nationwide survey was conducted to assess how professionals in the construction industry perceive their organization's DEI statements or policies. A complete data set was built from 249 participants. Results suggest that large companies have established policies and practices that result in better socialization and recognition of their DEI statements than medium and small companies. Also, construction and special trade companies need to strengthen their DEI statements and increase the representation of Women and underrepresented minorities. Finally, challenges and opportunities to improve the participation of Women and underrepresented minorities in the construction industry are presented and explained. Results from this paper give an idea about the current state of DEI in the construction industry and would contribute to the current effort to increase the diversity of the nation's construction workforce.

Introduction

In 2022, the construction industry employed 4.7% of workers in the United States [1]. This makes this sector appear in the list of the most important industries in the U.S. economy. Employment of construction workers is projected to grow 4% from 2022 to 2032 [1]; however, maintaining the current workforce and satisfying the future demand for construction-related workforce will become more difficult due to the aging and labor shortage issues in the construction industry [2], [3].

Workforce development priorities in the construction industry are not just about needing more people but also critically ensuring a more diverse community of workers. The solution to real-scenario engineering problems not only requires multidisciplinary teamwork but also a diverse team. A diverse team “promotes fresh perspective and ideas,

higher innovation, and greater creativity" [4]; besides, "A more diverse engineering workforce not only brings different perspectives to the world's most difficult challenges but also empowers people from all backgrounds in accessing engineering as a profession" (p. 104) [5]. Similarly, professionals should be able to recognize and understand the importance of valuing multiple points of view and the richness that having diverse teams brings to organizations [6].

Nevertheless, the Science, Technology, Engineering, and Mathematics (STEM) fields still have a low representation of Women and underrepresented minorities (i.e., demographic groups that are disproportionately less represented), for example, Hispanics or Latinos, Blacks or African Americans, Asian American, and American Indians or Alaska Natives [7]. Within the construction industry, Heckey and Cui [4] reported that there is a low representation of Women in this economic sector. It is important to mention that this industry employs professional and non-professional (laborers) workers. Even though underrepresented minorities are overrepresented, with about half of the construction laborers being Hispanics or Latinx [1], Women and underrepresented minorities with professional degrees (e.g., bachelor or higher degrees) are underrepresented.

To satisfy the future demand for the required increase of a diverse professional workforce in the construction industry, thus reducing the gap in gender inequity [3], [5], [8], it is important to improve the participation of Women and underrepresented minorities in the professional construction industry. There is a need to continue working on decreasing this gap and to bring the DEI conversation to the construction industry. Accordingly, this work-in-progress paper aims to know partitioners' (i.e., professional civil engineers and construction engineers working in the construction industry) perceptions about DEI in their companies. Besides, we present some challenges and opportunities to increase DEI awareness within the professional construction industry.

Literature Review

In this work, we adopt the definition of diversity, equity, and inclusion (DEI) given by The American Society of Civil Engineers [9]. Thus, diversity refers to the "range of human differences, encompassing the characteristics that make one individual or group different from another." The following characteristics are comprised by the term diversity: race, ethnicity, culture, gender identity and expression, age, national origin, religious beliefs, work sector, physical ability, sexual orientation, socioeconomic status, education, experience, skills, interests, marital status, language, physical appearance, and cognitive differences, and others that could become important for a specific sector. The fact that all people have "fair treatment, access, opportunity, and advancement, achieved by an intentional focus on their disparate needs, conditions and abilities" is known as equity [9]. To ensure equity, we all must promote inclusion, defined as "intentional, proactive, and continuing efforts and practices in which all members respect, support, and value others" [9].

Underrepresentation of Women and underrepresented minorities

DEI in the construction industry is still a topic that demands further attention to really solve the true systematic inequality and diversity issues [10], Women and underrepresented minorities remain highly underrepresented in the construction industry

[11]. Insufficient participation from Women still exists with no sign of improvement in the construction industry in the United States [12]. This trend was observed at the top-level executive positions [4] and at the supervisory positions [3]. The former found that most construction companies lack gender diversity in their leadership culture and mission statements [4]; they reported that Women fill only 3.9% of engineering leadership positions in the U.S. To worsen the situation, since the Women's graduation rate with a major in a construction-related field has not increased as needed, not enough Women are available for promotion into leadership positions [3]. “The absence of Women in leadership roles within the construction industry reinforces the field’s reputation for being dominated by white males” (p. 8). Of course, good recruitment strategies could increase the representation of Women in the construction workforce [8], but Morello et al. [13] reported in their study that 57% of Women said their company did not have specific programs for recruitment or inclusion of Women.

According to NCSES [7], Women accounted for 24% of bachelor’s degrees in engineering. Comparable differences in these field occur at the master’s and doctoral degree levels between Women and Men (p. 46-47). In 2019, for civil engineering college demographic was 25% Women in bachelor programs, 35% in master programs, and 9% in PhD programs [14]. Thus, after efforts to increase the representation of Women in Engineering, Women remain underrepresented in engineering degree awards. Even though, this gap between the share of degrees earned by Women in engineering has decreased over the past decade [7], there is still a low representation of Women in the construction industry not only in the United States [4], but also abroad [10], [15], [16]. In 2020, underrepresented minorities collectively earned 26% of bachelor’s degrees, 24% of master’s degrees, and 16% of doctoral degrees in STEM fields of study. White students accounted for 58%, 60%, and 70% of STEM bachelor, master, and doctoral degrees, respectively (p. 49-56) [7]. For civil engineering, in 2019, college demographics for underrepresented minorities were 18.2% in bachelor programs, 10.4% in master programs, and 4% in PhD programs [14]. Thus, these groups account for a much lower share of degree recipients at the bachelor’s degree level and above.

In addition to reducing the gap in earned degrees at all levels for women and underrepresented minorities, it is crucial to enhance recruitment and retention at the organizational level. Companies are required to have statements and policies supporting and attaining Women and underrepresented minorities, but equally important is fostering a work culture that encourages the participation and inclusion of this population. In 2020, the construction-related engineering workforce was represented by 14% Women and 86% Men, and according to race/ethnicity by 6% African American/Black, 8.4% Hispanic/Latinx, 12.2% Asian American, and 82% White [14].

Lack of support and reasons for leaving engineering

Maurer et al. [3] found that Women engineers are much more likely to leave their careers due to the absence of professional development and advancement opportunities. Hickey and Cui [4] reported some factors that discourage Women from joining or remaining in the construction workforce such as “male-dominated culture, conflict and aggression, slow promotion opportunities, and work-family balance” (p. 9). Some of these appreciations were also confirmed by Morello et al. [13], Women who wanted to leave the

engineering career referred to factors such as “age, loss of interest, and children as reasons for leaving” (p. 4). By contrast, “satisfaction with the work environment and the potential for growth and success were given as reasons for continuing” (p. 4). Age is an important factor in Women’s desire to leave or continue their career in the construction industry. Other important facts that could increase retention are “transparent promotion criteria and feedback, improved mentoring/sponsorship, and better maturity and paternity benefits” (p. 10) [17].

To increase retention of Women in the construction industry, it is important to understand the career path they most likely follow. Naoum et al. [17] confirmed that Women’s career path is varied because they are more likely to take time off work for family-related events (e.g., newborn children), which “results in a career that follows a zig-zag approach” (p. 4). It means Women will follow a nonlinear growing career path compared to the relatively smooth path for men. Opportunities for promotion and career advancement are also important for Women to succeed in the construction industry career path; Morello et al. [13] reported that “32% of Women in their study see fewer opportunities than their male counterparts. In addition, 72% of Women respondents preferred to take the initiative for promotions, instead of waiting for a superior to approach them about an opportunity” (p. 4), which clearly shows that Women believe promotions are far from being offered by the company.

Previous issues about the participation of Women and underrepresented minorities in engineering can be summarized according to the work of Hasan et al. [11], they found four major research clusters in their literature review paper: 1) gender roles and work culture; 2) glass walls (i.e., barriers that make it difficult for Women to enter the industry) and the glass ceiling (i.e., barriers that prevent Women from a career growth); 3) job satisfaction; and 4) gender diversity initiatives (i.e., nation level and company level statements, policies, or other initiatives that promote DEI). The latter being the one that can influence others by means of defining suitable DEI statements and missions that results in a more diverse industry.

Methods

Results in this work-in-progress paper are part of a larger project aimed at developing a framework for Connecting the Professional and Educational Communities of Practice (ConPEC) to improve the accessibility and communication between construction industry practitioners and faculty instructors thus promoting more significant interaction of students with their communities of practice (Authors masked for review). We aim for interaction within a more diverse community. We conducted a nationwide survey focusing on understanding the information that needs to be exchanged between construction industry practitioners or communities of practice (CoP) and faculty instructors; as part of this survey, demographic and DEI-related information was documented. This study did not delve deeply into the distinct elements or nuances of each term; instead, the authors were interested in understanding the overall meaning of DEI for practitioners.

The survey was randomly administered online to professional construction practitioners via personal contacts, LinkedIn, and listserv of industry network. The survey was administered online during the Spring 2023 semester, 249 industry practitioners filled it out, representatives from 26 states in the United States, and most participants are from the

State of Virginia. At the end of the survey, participants who were willing to participate in the focus group were asked to provide their contact information. Out of the survey participants who provided their contact details, only seven (7) had a common time to participate in the focus group discussion. The focus group discussions took place during the Spring 2023 semester with industry practitioners and faculty instructors as part of the project. As part of the limitations of this paper concerning the participation of underrepresented minorities, out of the seven participants in the focus group of practitioners, 2 were females and 5 were males. Additionally, 6 were White, and 1 was Asian. Some relevant comments from the focus group discussion are presented in this paper as well. It is important to mention that we secured ethical clearance through our IRB office (IRB # 22-379).

Quantitative data were analyzed using descriptive statistics, and some of the responses were analyzed by different variables to see if there were any important differences to show between participants. Qualitative focus group data was analyzed by memoing and coding strategies. Demographic and company-related data are presented next.

First, we classified results based on gender and race, demographic data is shown in Figures 1 and 2. About gender diversity (Fig. 1), 75% identified themselves as Men and 25% as Women, and nobody identified with other gender identities. About race diversity, 202 participants were White/Caucasian (81% of the sample), 11 were Black or African American (4%), 11 were Hispanic or Latinx (4%), and 16 were Asian (6%), 1 participant was American Indian or Alasca Native, finally 8 participants identified with others or did not specify (Fig. 2). It is important to mention that, in terms of participation of underrepresented minorities, this study has a significant limitation in that it fails to include a significant amount of data from these groups in the field. For example, only 15% of the sample corresponds to underrepresented minorities regarding race.

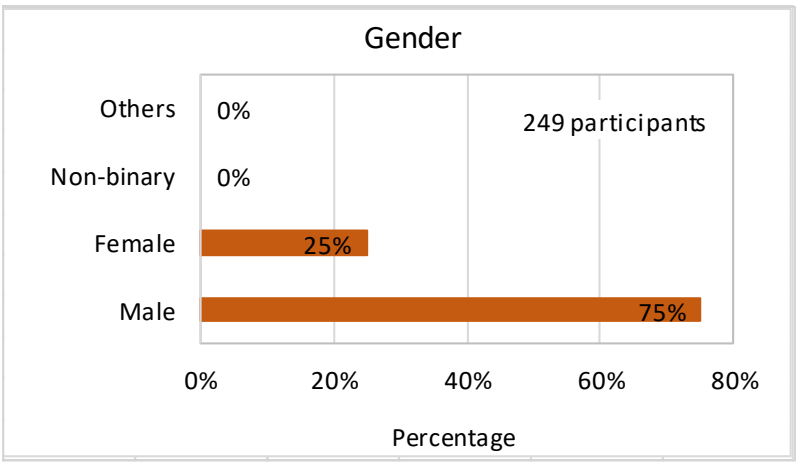

Figure 1. Practitioner's diversity, gender distribution.

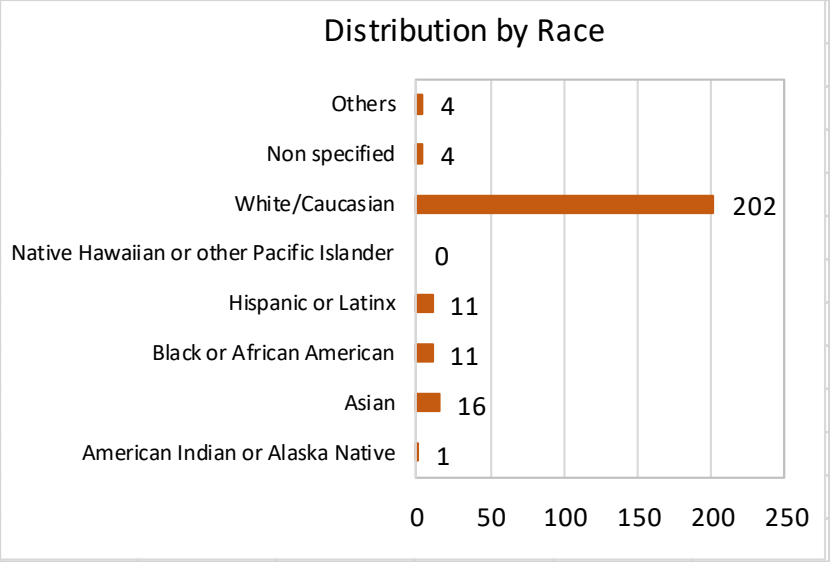

Figure 2. Practitioner's diversity, race distribution.

Regarding the number of employees, companies are classified as small, with less than 99 employees; medium, between 100 and 499 employees; and large, with more than 500 employees. Accordingly, participants are currently working in small (24%), medium (30%), and large (46%) construction and design companies located across The United States. Besides, companies were grouped into four main types, namely, building construction companies (67%), transportation construction companies (6%), special trade contractor companies (17%), and design companies (10%). In Figures 3 and 4 are shown the results regarding the company's size (Fig. 3) and type (Fig. 4).

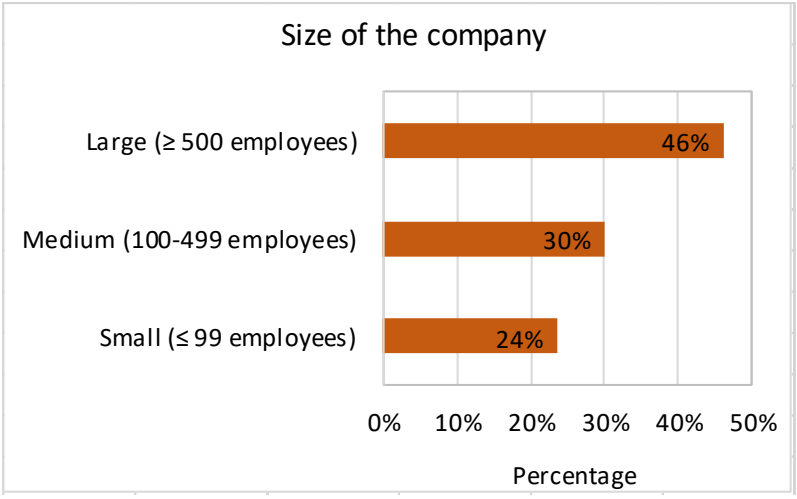

Figure 3. Size of the construction firm.

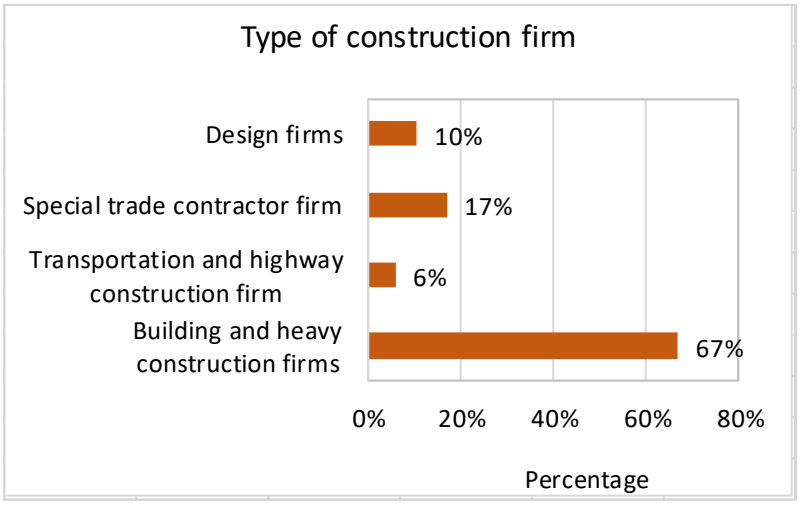

Figure 4. Type of construction firm.

In the next section, we present the results obtained from the survey and the corresponding discussion. Results from the focus group discussion are also presented in the next section to complement our discussion.

Results

Even though, the survey was deployed nationally, and we targeted different construction-related companies, results proved both male and White/Caucasian majority within the construction industry. This appreciation was also mentioned in the focus group discussion with faculty instructors. One of the faculty instructors mentioned that: "it is challenging to find diversity in this industry. There is no diversity in the construction industry, usually when looking for an industry practitioner to be a lecture guest speaker, most of the time you have some experienced white male, which reflects the non-diverse field as a whole and the issue about diversity and inclusion". Faculty instructors also agreed with the difficulty of accessing a diverse group of practitioners which makes it more difficult to ensure diversity when inviting them to any academic activity (e.g., capstone mentorship, workshops, conference speaker, lecture guest speaker).

To know how companies involve their employees in DEI, we asked practitioners if they knew (awareness) about DEI Statements in their company. We found that, out of the 249 participants, 71% of professionals identified DEI statements in their companies, 12% of professionals did not identify, and 17% did not know about DEI statements. In Figure 5 are shown these results organized by race. More than 80% of Black African American and Asian expressed awareness about DEI, but for Hispanic or Latinx this awareness was only expressed by 55% of them. Based on these numbers, we think companies still must put more effort into engaging all their employees in DEI conversations. Recall the limitation about representation of underrepresented minorities in this work; refer to Figure 2 for the distribution of practitioners based on race.

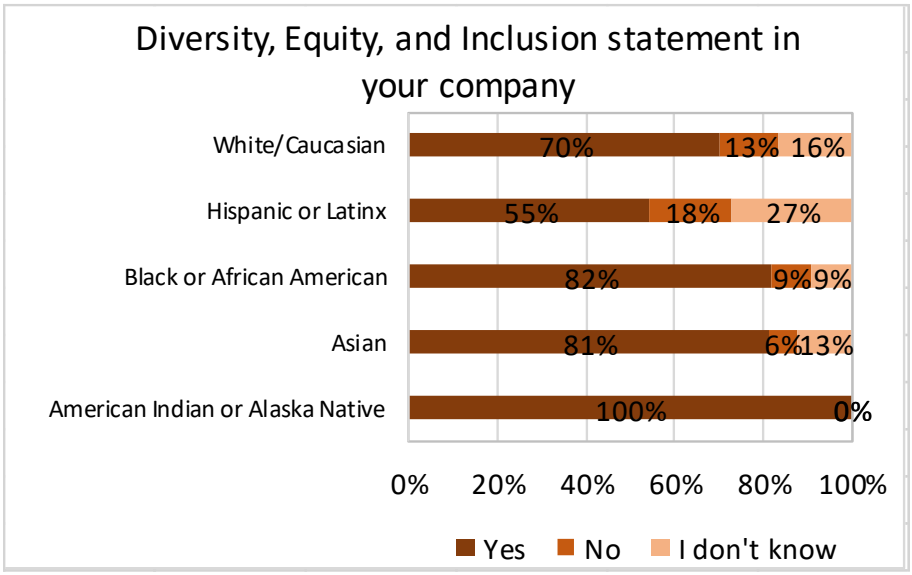

Figure 5. Practitioners' awareness about DEI.

Then, we asked them about their understanding of DEI, in other words, which labels are more related to DEI. The factors we asked for agree with those proposed by Karakhan et al [18]. The authors identified some pertinent indicators for achieving a diverse, equitable, and inclusive work environment in the construction industry. This perception of factor related to DEI is presented by gender in Figure 6. For over 65% of professionals in the construction industry who participated in this study, DEI was primarily linked to the proper representation of Women and minoritized populations in the workforce. This encompassed equality, social justice, and non-discrimination policies, particularly for women. Merit-based transparent recruitment and promotion, along with equitable payment and compensation, were highlighted, especially concerning Men.

Interestingly, factors such as the proper representation of Women and minoritized populations at the top management level, as well as payment structure transparency, did not emerge in the results. These three factors obtained the lowest correlation, with less than 50% of participants linking them with DEI, and there was no significant difference observed between genders. It's noteworthy that while the representation of women and minoritized populations in the workforce is associated with DEI, this association doesn't extend to their representation at the top management level. This observation sheds light on the close-knit nature of top management positions lacking diverse representation, as indicated by an average of 50% practitioners not associating this factor with DEI and there was no notable distinction observed between genders.

The study found a higher correlation between DEI and the representation of women and minoritized populations in the workforce, approximately 80%, while all other factors scored less than 65%. There is no significant difference regarding gender; for example, a similar trend is observed in what practitioners mean by diversity for both Women and Men.

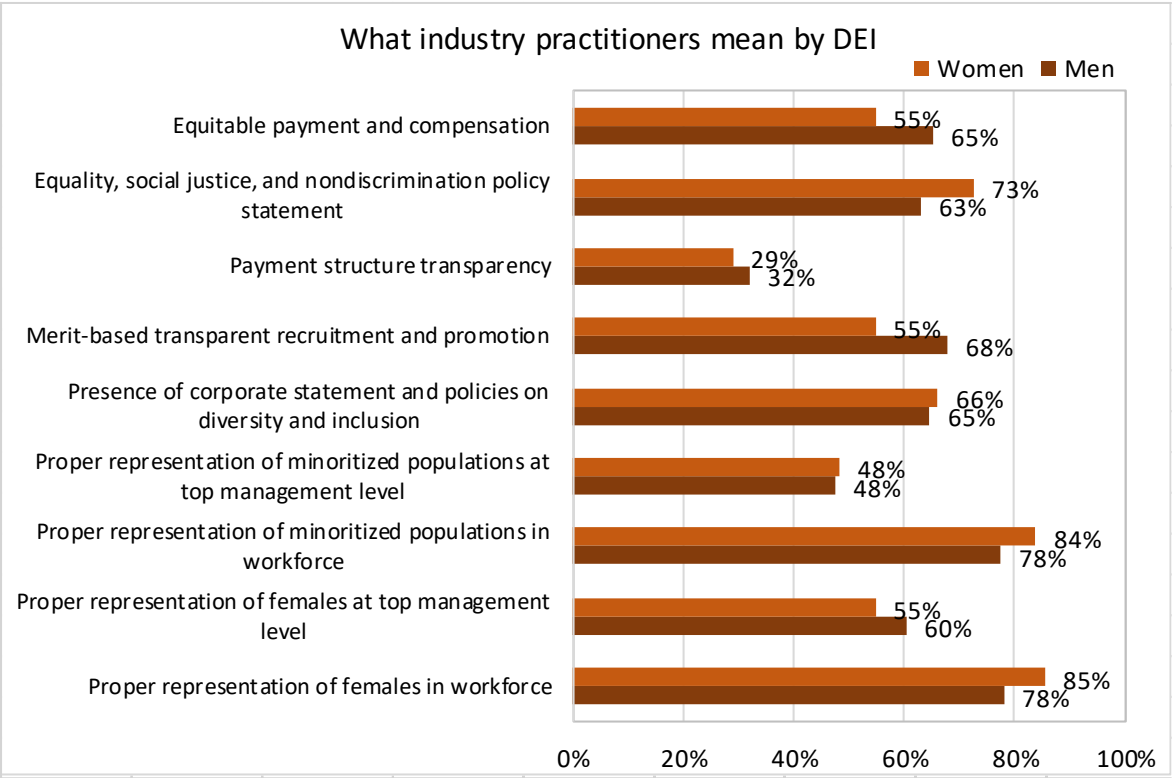

Figure 6. What industry practitioners mean by DEI.

Looking at the company size, 85% of practitioners in large companies identified DEI statements in their companies; but in medium and small companies, 71% and 42% of professionals identified DEI statements in their companies, respectively (See Figure 7). Thus, it is evident that large companies could have implemented DEI programs or professional development activities that promote DEI understanding. This could be due to their more likely diverse workforce within these companies. By contrast, small companies do not show the same commitment to DEI, one could assume that these companies have a less diverse workforce which does not bring the importance of this topic in the construction industry. This is proved by Figure 9, we asked practitioners to rate the DEI within their companies. In large companies, 60% rate the DEI in their companies as very high and high. By contrast, in small companies, only 40% rate their DEI as very high and high, which means 60% think companies are not diverse nor inclusive, see Figure 9.

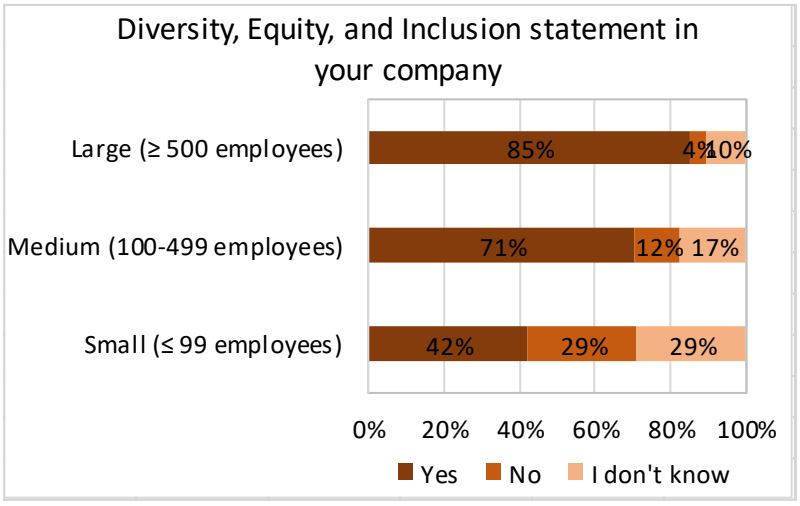

Figure 7. Relation between company size with DEI awareness.

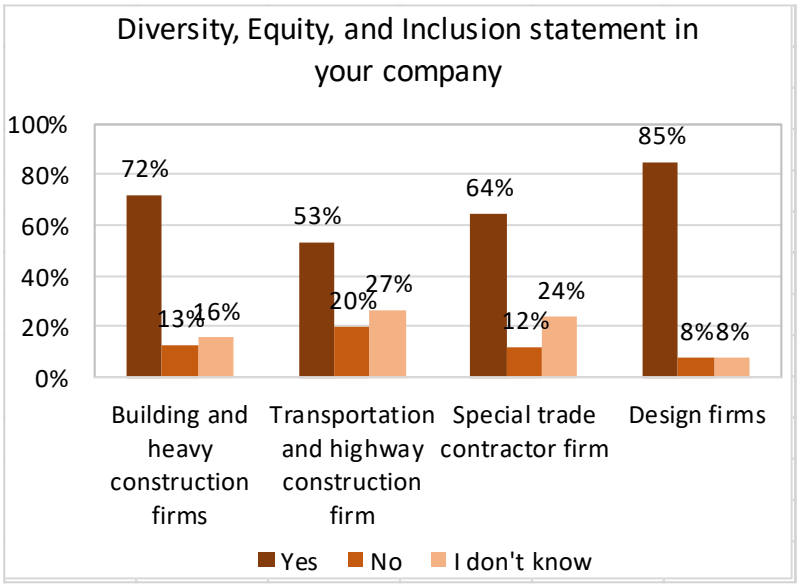

Figure 8. Relation between company type with DEI awareness.

According to the company type, 85% of professionals working in design firms recognized DEI statements in their companies, 64% in special trade companies, 53% in transportation and highway construction, and 72% in building construction. Design firms hire more employees with a master's or PhD's degree, which probably results in a more diverse workforce so both employers and employees are more aware of DEI. By contrast, transportation and highway construction firms are less aware of the importance of DEI Statements within the company, see Figure 8. In addition, design firms differ from other construction-related firms which usually demand more Men for the heavy duties or more work time required in these kinds of companies. So, it is harder for construction-related firms to get involved in the importance of DEI statements regarding the inclusion of Women. However, every so often physical strength is habitually used as an excuse to

discriminate against Women [11]. We encounter the same issue when categorizing the data based on both company size (Fig. 9) and company type (Fig. 10) concerning their DEI rating. For instance, as the company size increases, the rating or importance of DEI also increases for their employees. Notably, in design firms, 69% of employees rated the company's DEI as very high or high; however, in construction-related companies, such as special trade contractors, transportation and highway construction, and building construction companies, less than 50% rated the company's DEI as very high or high, as shown in Figure 10.

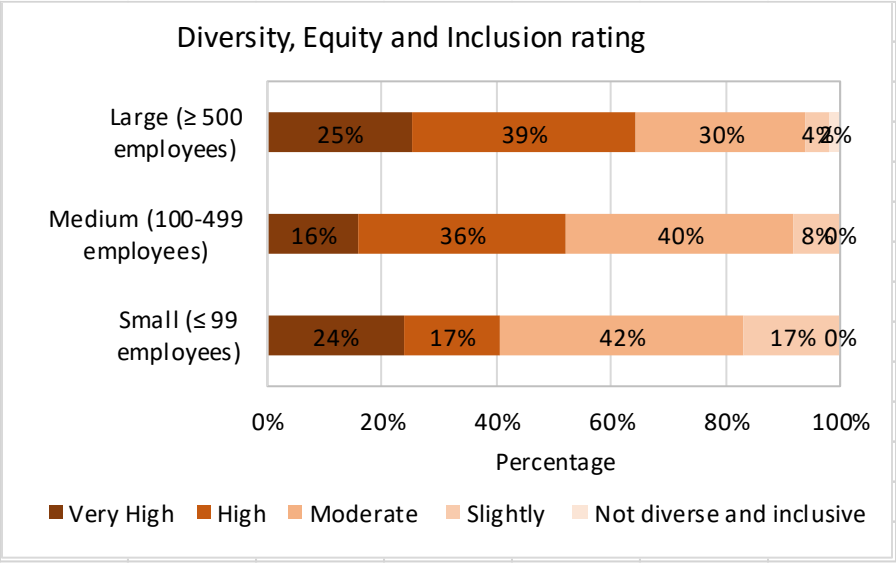

Figure 9. DEI rating according to the company's size.

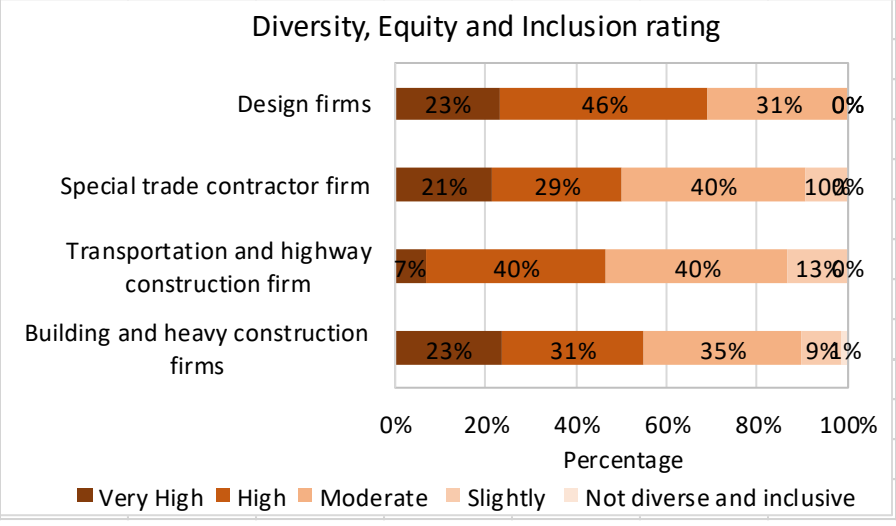

Figure 10. DEI rating according to the company's type.

Discussion: Challenges and Opportunities

Even though DEI conversations have been on the table for some years now, we still have to strengthen the participation of Women and underrepresented minorities in the construction industry at all levels. There are some challenges in developing a diverse construction workforce [19]; to illustrate, not enough people from underrepresented minorities are entering college and graduating with a bachelor's in construction-related fields; not enough professionals from these groups compete for top-level management/leadership positions; lack of suitable recruitment strategies that promote the participation of professionals from underrepresented minorities; lack of suitable retention strategies that ensure professional development and long career paths, especially for Women; lack of DEI statements, or awareness of them, in some companies, especially small and medium size companies.

Conversations about DEI in construction-related companies, including special trade contractors, transportation and highway construction, and building and heavy construction firms, prove more challenging. These companies often excuse themselves by citing the need for a heavy-duty workforce, historically accomplished by men. In supervisory positions, these companies typically demand long working hours and extensive travel to fulfill the required responsibilities. This poses challenges for Women who aspire to be part of this industry. Conversely, in design companies and at top-level management/leadership positions, Women and underrepresented minorities could play a pivotal role in enhancing diversity within the construction industry. According to our results, employers did not associate the participation of women and underrepresented minorities at the top-level management/leadership with DEI. This lack of association could lead to a dearth of appropriate policies supporting the inclusion of these groups in such positions, possibly stemming from a lack of awareness within the company's administration. Therefore, it becomes imperative to educate the next generation of the workforce on the concepts, importance, and issues surrounding DEI.

In addition, we observed that introducing diversity into the academic community from the community of practice (i.e., practitioners) is challenging due to the current lack of diversity in the construction industry. Faculty instructors indicated that the construction industry is predominantly represented by White/Caucasian men, a statement that can be supported by our findings. Most of the time, when faculty instructors aim to bring practitioners into academic settings, such as having guest speakers for lectures, they often find themselves confronted with the presence of White/Caucasian men. This challenge disrupts the role model strategy proposed by some authors to raise awareness about DEI among college students.

Based on the literature reviewed and the results obtained in this work-in-progress, we posit that there are two primary settings where DEI awareness must persist to safeguard a diverse and inclusive construction industry in the near future, namely, academic and company settings. It is worth mentioning that moving towards a diverse and inclusive construction industry necessitates the creation and strengthening of DEI awareness in new graduates. For this reason, efforts should be predominantly focused on the academic setting, specifically by implementing DEI conversations within the classroom.

First, within the academic setting, during the focus group with faculty instructors, there was an agreement on the importance of bringing the DEI discussion into the classroom. DEI issues and related factors are important because students will work for companies, so it is important they know and understand how companies talk about diversity. But also, they should bring that conversation to the companies. To illustrate, faculty instructors gave the following example: "one former student could quit a job because the student felt discrimination in the company, or the student does not find diversity alignment with the company". Thus, academia must prepare graduates to face these difficulties, giving solutions to the issue. Accordingly, the conversation about diversity between faculty instructors and students must happen as well as between academia and industry. Academia has a unique and exceptional role in overcoming the lack of diversity in this industry. Recalling the role model framework, engineering schools should promote a diverse group of faculty instructors, this was mentioned by professional practitioners in the focus group discussion as well.

As part of this academic opportunity, fundamental ideas should be introduced into the curriculum, such as preparing students to collaborate in diverse teams and encouraging them to propose inclusive engineering solutions. This involves considering the complete representation and diversity of our society when implementing any engineering design and, of course, when executing engineering projects. Faculty instructors play a crucial role, as indicated by research on student-faculty interactions. There are various ways in which DEI is integrated into classroom settings, such as through the syllabi, class discussions, and the behavior modeled for students [20].

Engineering schools must be aware of the "ineffective approach of DEI training in students" (p. 2) [21]; thus, DEI should be included within the curriculum rather than maintaining it as a training session or workshop. Morello et al. [13] reported that lecture series for students in college, construction-related sororities in college, and college chapters of trade groups could contribute to increase the number of Women in construction-related careers. Also, internships or summer work placements are good strategies to bring diversity into construction companies.

Turning the attention to the company setting, there are again some ideas that will contribute to a more diverse construction industry, for instance, establishing DEI statements; creating professional development programs in DEI to educate current employers who have not been exposed to DEI before; equitable professional development opportunities and pathways to promotions, especially toward top-level management/leadership positions; developing innovative recruitment and retention programs based on the person's merits. During the focus group discussion with professional practitioners, it was mentioned that construction companies are actively working to increase the participation of underrepresented minorities in the construction industry.

In a "workplace setting/culture, the predominant group will set the working environment within the working place, the traditionally marginalized person will have to adapt and fit in or quit and leave the workplace" (p. 2) [22]. "The culture is the hardest part of an organization to change and recommendations that challenge the predominant culture continue to face significant resistance" (p. 12) [11]. For this reason, company administrators must be attentive and demonstrate commitment to DEI issues within their

companies. This can be achieved, for example, by establishing and promoting DEI statements and inclusive missions.

Increasing the participation of Women, especially in leadership roles, will help attract and retain Women within civil and construction engineering-related academic programs [3]. Offering development opportunities and pathways to promotions that support the advancement of women and underrepresented minorities into top-level management/leadership positions will result in career satisfaction and retention within the construction industry [3], [13]. Family-friendly benefits, especially for Women, that contribute to a better work-life balance have been shown to improve retention rates in the construction industry [3], [11]. Another important factor found to contribute to recruitment and retention is merit, Naoum et al. [17] noted that women emphasized the importance of merit as a crucial criterion for recruitment and promotion within organizations. Consequently, it is imperative to develop innovative recruitment and retention programs to promote diversity in the construction industry.

Future work

Now that we are aware of the low diversity in the construction industry, we aim to leverage the ConPEC web platform not only to enhance accessibility for industry practitioners to construction engineering education but also to foster diversity exchange between the two settings. This involves bringing diversity from academia to industry and vice versa. From the Engineering Education perspective, we will continue our efforts towards enhancing the intersection of DEI and professional identity development.

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