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Effects of COVID-19 on the Safety Procedures Implemented in the Construction Industry: A Survey

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COVID-19 has significantly impacted the construction industry when it comes to the safety of workers. While the Occupational Safety and Health Administration (OSHA) has come up with some requirements for improving workplace safety for COVID, no study has been done on its effects on construction companies. The guide provided by OSHA talks about topics such as which workers are more at risk, how to stop the spread, and what Personal Protective Equipment (PPE) to use, but not about the overall effect it could have on workers. Also, as it is still quite a recent problem, there is not enough data for it. The purpose of the study is to assess the effects of COVID-19 on safety procedures in the construction industry. In this study, a questionnaire survey was used to collect important data about the safety-related issues faced by workers in the construction industry during COVID-19. The study mainly focused on the impacts of the virus on the safety of construction workers in the U.S. The collected data regarding the safety practices during COVID-19 provides some useful information that could be used to improve workers' safety in construction while keeping the business running.

Key Words: COVID-19, Construction Safety, OSHA Regulations

Introduction

COVID-19 has plunged the construction industry into the most challenging times. OSHA has been dealing with the safety of construction workers on one hand and coming up with protocols for COVID-19 on the other hand. This has somehow abetted the construction companies in curbing the spread of the COVID-19 virus. However, the current turbulent times can be an opportunity for companies to come up with a model that curtails the spread of the virus and be a benchmark for future challenges. Although OSHA recommendations have been relatively adopted as recommended by the CDC for the construction companies, little research has been done to address the impact of these recommendations. The recommendations need to be assessed and evaluated, followed by a rational plan of action. To

address this nominal gap, this study has analyzed data gathered using a survey questionnaire from 450 different construction-related companies in the U.S. This will give us an in-depth analysis of the best practices during COVID-19 and benchmark for other companies across the globe who are struggling with the safety of their employees during this unprecedented time. Moreover, this study is expected to help competent authorities in making prudent decisions for developing new protocols on construction sites.

Literature review

Although the overall construction industry took a plunge at the height of the COVID-19 pandemic, very little research is available on the effects of COVID-19 on the safety of construction workers. According to Amoah and Simpeh (2020), the COVID-19 epidemic has drastically changed safety protocols in the construction industry, better yet, every industry. In response, the construction industry has implemented rigorous safety measures the construction sites to slow the diseases spread among the construction industry. The researchers examine the construction workforce's challenges due to the unforeseen onset of the COVID-19 pandemic. Cates and Swanek (2020) find out that 87% of contractors report delays in projects at the onset of the COVID-19 pandemic. However, contractors are less concerned about delays in the future. Index results say that one in three contractors plan to hire more workers soon. The researchers state that the pandemic is also acting as a spark for technological change in the construction industry. While the industry took a hit at first, it seems as if it will bounce back in the end.

Gamil and Alhagar (2020) stated that many countries had declared a lockdown since the World Health Organization announced the Coronavirus pandemic. These decisions resulted in business shutdowns, including the construction industry. Their study investigates the effect of COVID-19 on the construction industry's survival. The study found the most prominent impacts of COVID-19 are the suspension of projects, labor impact and job loss, time overrun, cost overrun, and financial implications. According to Ogunnusi et al. (2020), the effect of this pandemic in these unusual times posed both positive and negative impacts in the Architecture, Engineering, and Construction (AEC) industry. Its effect has brought supply chain disruption, new policy issues, and worker anxiety. Its effect has also brought about innovative and diverse use of technology in an ideal manner which may change the course of construction even after the extinction of coronavirus.

Pasco et al. (2020), the decision of resuming construction work during shelter-in-place orders was associated with increased hospitalization risks in the construction workforce and increased transmission in the surrounding community. According to the study, the allowing of unrestricted construction work was associated with an increase in COVID-19 hospitalization rates. Clark (2020) stated that communicating with your employees during COVID-19 is essential to keeping them safe, informed, and productive as they adapt to sudden and unexpected changes. According to Clark, with things changing rapidly, it can be hard to know what to say when things will return to business-as-usual. Clark suggested nine ways to communicate: communicate early and often, stay focused, be clear, reinforce your values, establish a single source of truth, assign authority, involve people managers, show care, and provide two-way communication.

D'Auria and DeSmet (2020) stated that COVID-19 had posed challenges in communicating with all people of interest. The researchers go into five behaviors to help leaders navigate the pandemic and recovery: organization, remaining calm, making decisions with optimization, demonstrating empathy, and communicating effectively.
Goodman (2020) stated that the coronavirus crisis changed the construction industry immediately, and

some of the implementations put in place will be around even after the pandemic decreases in magnitude. As the industry prepares to hit the ground running, they will be faced with new challenges because of COVID-19. This article goes into eight ways that the coronavirus has changed the construction industry. According to Associated General Contractors (AGC) of America (2020), construction employment has declined by 975,000 jobs in April of 2020. AGC stated that the construction industry is not immune to the economic impact being caused by COVID-19. Without Federal funding, it is hard to predict when and if the industry will be able to recover anytime soon.

Alsharef et al. (2021) believe that the COVID-19 pandemic had been the largest global health crisis in decades. Apart from the unprecedented number of deaths and hospitalizations, the pandemic has resulted in economic slowdowns, widespread business disruptions, and significant hardships. The safety measures adopted to mitigate COVID-19 included: requiring employees to wear cloth face masks, social distancing protocols, staggering of construction operations, offering COVID-19-related training, administering temperature checks prior to entry into the workplace. Belingheri et al. (2020) stated that healthcare workers have an increased risk of contracting COVID-19, but a recent study has reported that other workers may also be exposed to the coronavirus, including staff in tourism, retail and hospitality industries, transport and security workers, and construction site workers. Considering the current situation and the ongoing spread of COVID-19, action needs to be taken for all work fields. Physicians and other Health Care Workers are generally used to implementations regarding the containment of a disease. While generally, people in other fields of work are less accustomed to these practices. This research looks to provide information to assist in slowing or stopping the spread of COVID-19 in non-health care-related fields.

Stiles et al. (2021) stated that construction has been significantly affected by COVID-19 and is critical to economic recovery. The construction industry needs to be diligent in safety and risk mitigation in pair with timely project delivery. Therefore, an ordinance for COVID-19 must be implemented so that the industry can keep running while keeping people safe. There is not a lot of knowledge on this issue, though. The researchers stated that some safety implementations are more difficult to follow because of projects' temporary duration and phases. Pamidimukkala et al. (2021) indicated that COVID-19 has completely shifted how people work. These shifts have been in the form of distance. Most office workers are able to work remotely. Factors such as isolation, home situations, and job stability often contribute to anxiety and depression. This study looks to identify the challenges accompanied by COVID-19 in the workplace and how to mitigate these challenges to positively impact the health and safety of workers.

Simpeh and Amoah (2021) find that most construction companies have instituted measures to curb the spread of COVID-19 on-site. Additionally, some companies have implemented extra protocols to mitigate the spread of COVID-19 on the jobsite. Few construction companies were lacking in these preventive measures. Data shows that points of weakness for COVID-19 mitigation on the jobsite were jobsite screening, handling of materials and equipment, and jobsite deliveries. These are areas where improvement is necessary to help curb the spread. Olukolajo et al. (2021) indicated that construction workers' outlook on COVID-19 could be the key to mitigation or another lockdown. The researchers surveyed onsite construction workers. The findings show that the preventive measures to mitigate COVID- 19 can be classified into the groups as follows: personal protective measures, etiquette, contact precautions, and prompt actions. The workers taking the survey stated to be aware of the pandemic. However, their temperament towards the preventative measures implemented on constructions sites is daunting.

Bsisu (2021) stated that the lockdown resulting from the COVID-19 pandemic has caused Civil Engineering design offices to work remotely. The pandemic has also caused continuing construction

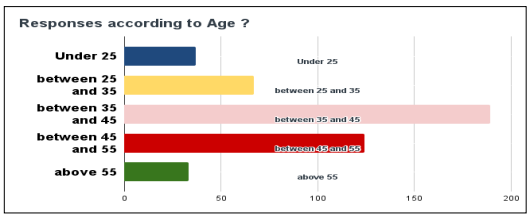
projects to come to a halt. An online questionnaire was posed to Jordanian personnel about their perception of the lockdown. Those design engineers were able to work from home with efficiency, while site engineers and construction workers could not say the same. Site engineers do not believe that construction workers will adhere to the guidelines implemented to mitigate the virus after the lockdown is lifted. Dennerlein et al. (2020) conducted a study to create an integrated work approach to support worker safety, health, and well-being during the COVID-19 pandemic. Emerging workplace recommendations were investigated for reducing workers' exposure to COVID-19 and the challenges posed to workers in protecting their health. The recommended approach includes six characteristics: focusing on work conditions for infection control; identifying daily challenges; collaborative efforts to increase efficiencies; committing as leaders to supporting workers; adhering to ethical standards, and using data to evaluate progress.

Araya (2021) indicated that as the spread of COVID-19 has continued, stay-at-home orders have been placed around the globe. While some jobs can be completed virtually with little to no change, this is not the case for all. Construction cannot be easily completed virtually. The construction industry makes up approximately 13% of the Global GDP. Therefore, having the ability to perform construction tasks while minimizing the spread of COVID-19 will help with the financial response of the pandemic. This study aims to understand the potential impact of COVID-19 on construction workers using an agent-based modeling approach. Activities are classified as being low, medium, and high risks for workers. The simulation found that the workforce may be reduced from 30%-90% on a given construction project due to the spread of COVID-19. Understanding how COVID-19 may spread among construction workers may help project managers to create adequate mitigation techniques to reduce the chances of infection. Bushman et al. (2021) investigated COVID-19 outbreaks at two separate construction sites. Difficulty in following the Interim COVID-19 Guidance for Construction set in place by the New York State Department of Health was reported. To minimize outbreaks, the researcher concluded that jurisdictions should increase specific implementations, emphasizing infection prevention.

The literature review reveals that there is no information about business support programs such as the Payback Protection Program. Payback Protection Program is a loan that helps businesses keep their workforce employed during the COVID-19 crisis. This loan is provided by the US Small Business Administration. This study will survey safety measures during COVID-19 in the U.S. construction industry, including the effect of the Payback Protection Program to keep businesses operating during COVID-19. The next section will discuss the survey process and results.

Safety Practices Survey

The survey targeted people from various age groups, different experiences, and different job titles. Survey Monkey was used to distribute the survey. The first set of questions was demographic (3 questions). The second set of questions was technical and targeted best practices used in the construction industry (11 questions). The survey was distributed to the construction industry in the U.S., and 450 responses were collected. The survey results are shared below.



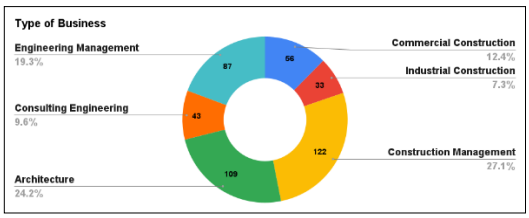


Figure 1.A (left) & 1.B (right). Respondents' age and business types

Figure 1.A illustrates that most of the survey questions were answered by mid-age people (34-45); the next group who contributed to the questionnaire were people between 45 and 55 years old. Figure 1.B shows the type of business of the people who took part in the survey. Construction management took the lead in the survey with 27.1%. Architecture companies come next for 24.2%.

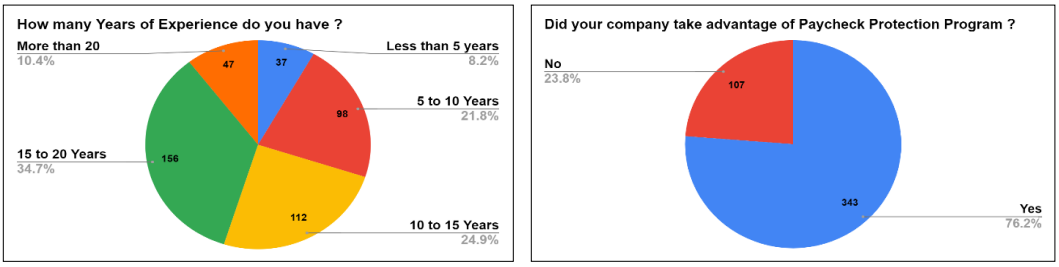


Figure 2.A (left) & 2.B (right). Respondents' experience and Paycheck Protection Program (PPP) awareness

Figure 2.A shows that 34.7% of the respondents have 15-20 years of experience, followed by 24.9% who have 10-15 years of experience. 21.8% of the participants have 5-10 years of experience. Figure 2.B depicts the response of people when asked if their company took advantage of Paycheck Protection Program. 76.2% of the participants responded positively, while 23.8% answered that their company did not take part in PPP.

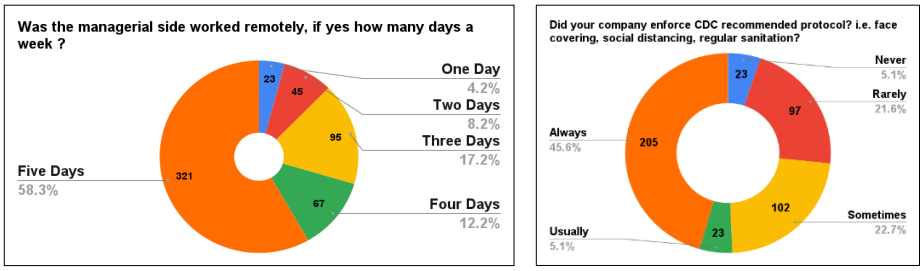


Figure 3.A (left) & 3.B (right). Remote work and CDC protocol

Figure 3.A represents the response of the people about the frequency of remote working. Out of 450 responses, 58.3% said the managerial side worked from home completely (5 days). Meanwhile, only 4.2% said they had one day of working remotely. In general, most companies implemented a policy of working from home. Figure 3.B shows that responders have diverse views when asked about the implementation of CDC protocols. 45.6% of the responders always enforce CDC recommendations, while 21.6% enforce it rarely.

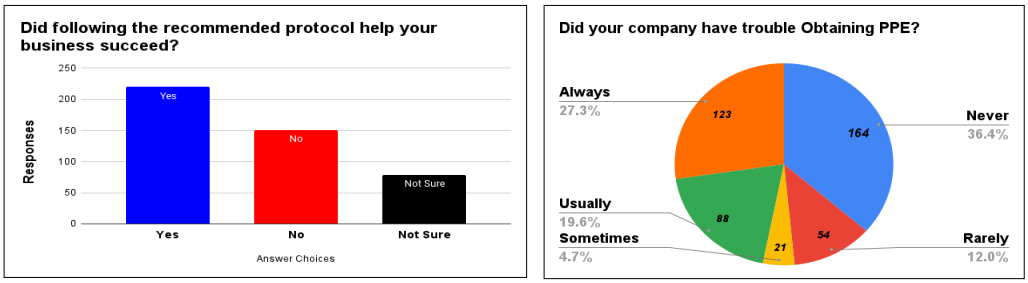


Figure 4.A (left) & 4.B (right). The benefits of following protocol and the PPE availability

Figure 4.A illustrates that the majority of the responders in the survey answered positively about the benefits of the recommended protocols. However, less than half of the participants responded negatively about protocols and some of them were not sure about it. Figure 4.B shows that 27.3% had a constant problem getting PPE, however, 36.4% of responders showed their satisfaction about getting PPE. Other responders had issued sometime while getting PPE.

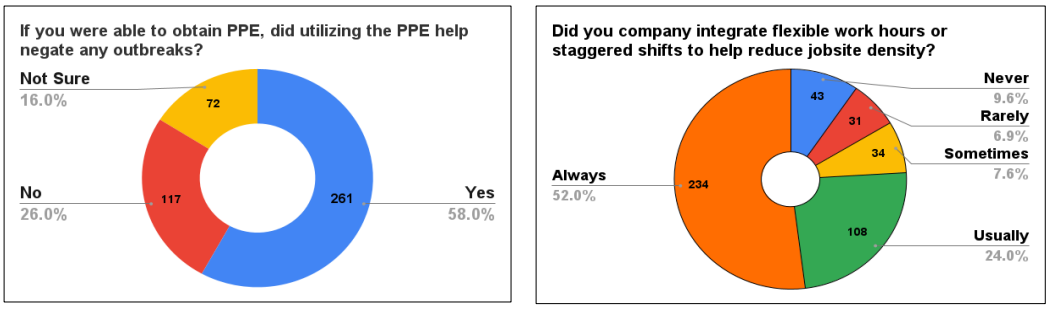


Figure 5.A (left) & 5.B (right). Utilizing PPE and the benefits of flexible work hours.

Figure 5.A depicts that the majority of responders believe that PPE utilization helps them mitigate the risk of COVID-19. Only 26% responded negatively to the effect of PPE. Figure 5.B shows that the majority of responders have flexible working hours during COVID-19, however, some people answered that they were unable to work in shifts.

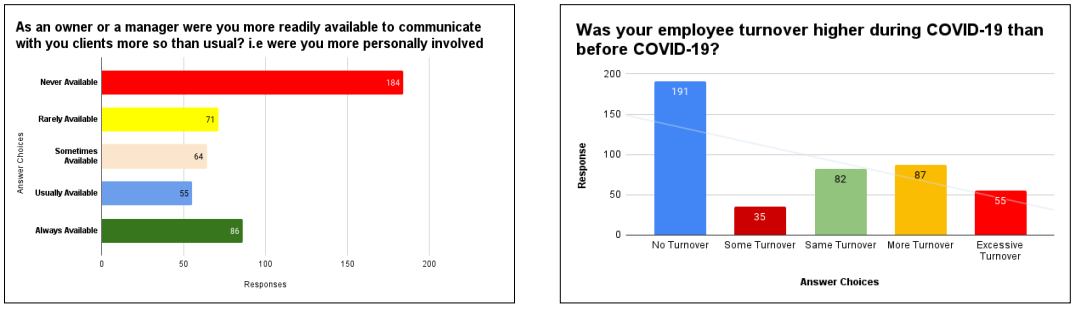


Figure 6.A (left) & 6.B (right). Communications and turnover questions

Figure 6.A shows that during COVID-19 most managers were not available for communication with clients, although 86 people answered that managers were able to communicate during the pandemic.

Other responders answered that managers were rarely available. Figure 6.B illustrates that during COVID-19 majority of organizations had more turnover, although 191 of the 450 responders answered that they had no turnover.

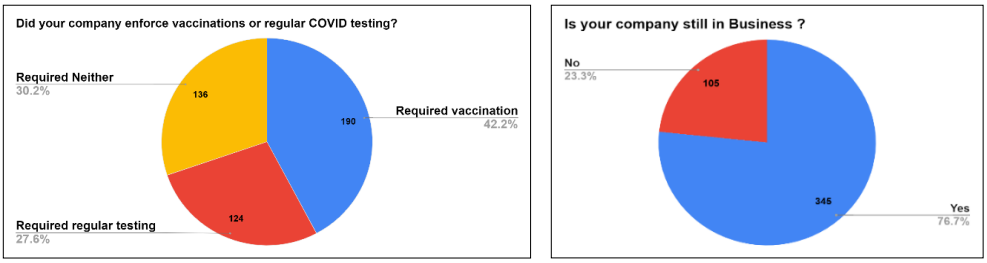


Figure 7.A (left) & 7.B (right). Vaccination enforcement and business status

Figure 7.A illustrates that the company of 42.2% of the responders required vaccination while 27.6% required regular testing and 30.2% required neither. Figure 7.B shows that majority of companies are still in business while only 23.3% went out of business due to COVID-19.

Conclusion

This research conducted a survey to collect important information about construction safety practices during COVID-19. The research provided some insight into the impact of COVID-19 on construction companies. As determined in this study and stated earlier, relatively many companies enforced vaccination or regular testing. This practice allows the company to have a feeling of security knowing that their staff is not viral. Also, many companies opted for remote work (for office or offsite work) during the pandemic and engaged in job shifts to reduce job density on the site. The ability to telework and or work various shifts ultimately slowed the spread due to people not being together as often. All companies followed the recommended protocol when able, but half of them were not sure if the practices implemented were helpful to their business success. About 76.2% of the survey participants took advantage of the Paycheck Protection Program, while 23.8% were not aware of the program.

This is pertinent information that companies must be aware of. There needs to be more education, statistically showing how the recommended procedure works. This will ultimately convince more people to follow the recommended protocol and help mitigate the spread of COVID-19. Fortunately, all the businesses that participated in our research are still in business which shows the resilience of their respective businesses and the effectiveness of the recommended practices. In a nutshell, this study has provided the construction industry with significant data about the overall impact of the recommended practices, and it can be concluded that the recommended practices have been fruitful when it comes to curbing the spread of the virus.

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