

Perceptions of Efficiency in Construction Jobsite Safety

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This project is to examine the perception of jobsite safety practices of California contractors. Preliminary research found that jobsite safety practices are not a hinderance on a project schedule when managed well. A survey of students and industry professionals was the methodology used to gather this information. This survey consisted of various questions about the perception of safety practices on jobsites the respondent has worked on themselves, as well as their perception about safety in the construction industry as a whole. Significant findings were that half of the surveyed individuals had worked on a job site in which they lost time due to a lack of safety equipment. Additionally, a majority of survey respondents agreed that following proper safety procedures slows down production in the field. On the majority of jobsites, workers were unable to bring all of their safety equipment out at once, highlighting an inefficiency in the field. These findings indicate that improvements can be made in efficient safety practices in the future.

Key Words: Safety, Jobsite, Construction, Cal Poly, Equipment, Cal/OSHA, Contractors

Introduction

Jobsite safety is an ever improving process. In California, Cal/OSHA sets the minimum standards for safety. Theses standards require employees to undergo extensive safety training before entering a jobsite. Additionally, Cal/OSHA grants rights to refuse dangerous work to employees. A Cal/OSHA investigation can hinder citations potentially leading to fines and sanctions for a contractor (Sum, 2015). Delays in work mean a longer project, and can put a contractor at risk of liquidated damages. Furthermore, safety violations can damage a firms reputation and in turn hurt their ability to procure later projects. As such, it is in the contractors best interest to adhere to Cal/OSHA standards.

While Cal/OSHA standards are a good place to start, there is reason to believe that going above and beyond these standards can bring returns on investment to a contractor.

Existing Safety Methods

Improvements in safety can greatly increase the reputation of a contractor. Studies have shown that not all safety practices in use are effective, and the side effects of these programs can actually decrease safety on a jobsite. It is becoming more apparent that upper-management techniques have greater bearing on jobsite safety than policies at the ground level. Using a variety of safety methods, contractors worldwide are finding ways in which they can increase safety and in turn increase productivity of their workers.

The State of Safety Management Practices

Given that construction safety is largely enforced at a state or federal level, one might think that incentivizing safety practices would lead to safer jobsites overall. This is not the case. Incentive-based safety programs often lead to an initial spike in safety, with long term regression to prior behaviors. Incentive programs require a contractor to keep detailed accounts of their safety practices, which adds a burden to management as paperwork piles up. An increase in work for the contractor tends to lead to a lack of safety safety motivation, and in turn can cause matters to worsen as a contractor is less likely to report their safety practices honestly (Guo, Yiu, & González, 2015); This is not unique to management incentives.

Pay incentives for workers in the field have shown to have an adverse effect on safety. Safe work practices, as necessary as they are, can take a toll on a work schedule if not properly accounted for. Projects in which management offers pay incentives for completed work have shown to increase production at the cost of safety. Workers want to be as productive as possible and when they are incentivized to increase production, less experienced workers will try to match the production of their more experienced peers. Safety consciousness has been shown to increase with exposure to construction work, meaning that a lesser experienced worker will be less likely to adhere to safety practices when trying to increase their production (Wang, Zou, & Li, 2016). A major contributor to this problem is the hierarchy of seniority on a jobsite. "If older workers do something wrong, young workers are not confident enough to point it out. They tend to observe them and copy them," (Guo, Yiu, & González, 2015).

Effective management techniques are crucial to a contractor that wishes to increase jobsite safety. External risk factors have a greater bearing on construction worker's safety than internal factors (Wang, Zou, & Li, 2016). This is to say, a construction worker is more affected by the will of his superiors than his own safety compass. In the past, this has allowed management to push workers for more production. Now in today's safety conscious construction culture, it is important to prioritize safety over production. In a perfect world, safety would be everyone's first priority; however, "Blame culture is absolutely common in the industry. After accidents occur, managers tend to point the finger at workers, without addressing root causes of accidents. Workers just do the best they can. People fail to ask why unsafe acts are acceptable on site" (Guo, Yiu, & González, 2015).

Effective Management Techniques

Past projects have shown that increases in safety do not have to come at the cost of efficiency. Proactive safety management has been shown to actually increase field production in some cases. A case study performed on Skanska, a global contractor, provided insight as to why safety practices can create an efficient jobsite culture. Before the startup of a project in San Antonio, TX, the management team "[brainstormed] to formulate a game plan to benefit workers." They were working in an unforgiving environment in the Texas sun, and were able to change up their construction schedule to provide a better working environment. This was accomplished by paving the site's parking lot first, and providing material for the workers to build themselves a covered break area complete with picnic tables (Moucka, 2008). Using these techniques, Skanska was able to increase worker retention on site because workers preferred an environment that provided them a safe place to relax in hot conditions. Additionally, they found that this led to better housekeeping in the building. Respect for construction workers is reciprocated in the work that they perform.

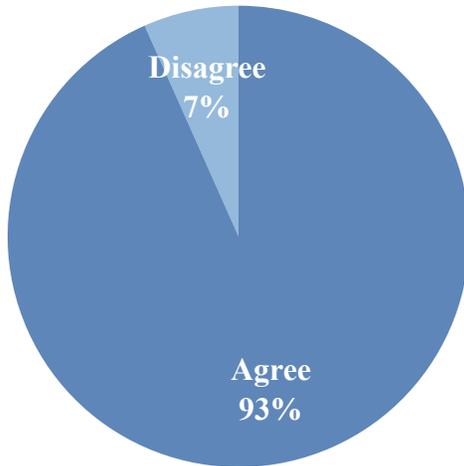
Proactive approaches to safety have been found to be more effective than reactive policies. For this reason it is important that innovation in safety continues. Another such technique used to increase worker safety is the use of building information modeling (BIM) in safety planning. Given that a construction site is an always-changing workspace, BIM is an advantageous technology to safety planning. BIM applications were used alongside a safety database in the building of the MBA-block of the National Institute of Technology, Kurukshetra, India. This application of BIM allowed the university to remain open to students despite the overhead construction. Additionally, they were able to continuously identify risks as the project progressed. In using this system, it was shown that the decisions of designers and project planners have a direct impact on jobsite safety, despite not being present on the jobsite themselves (Bansal, 2011).

Leading indicators of safety can be used in order to judge the likelihood of a safe project. In order for this system to be successful, it is vital for management to commit to the practice. Examples of leading indicators used by contractors are as follows: Percent of jobsite toolbox meetings attended by jobsite supervisors/managers, Percent of negative test results on random drug tests, and worker observation records of what can be improved in terms of jobsite safety (Hinze, Thurman, & Wehle, 2013). Indicators such as a near-miss incident can be seen as a reason to make a proactive change to a safety policy, but often go unreported due to their negative implications. Near-miss incidents can still be treated seriously and be punishable, but it is important to implement a change in policy when an indicator presents itself. The best practice to increase the usefulness of leading indicators is patience. These are long-term statistics that can help a contractor improve their safety record going forward, and are best used in conjunction with safety policy, not as a replacement.

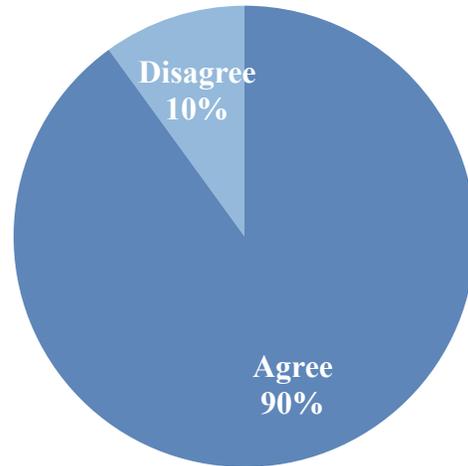
Methodology

Upon reviewing the literature, it is clear that jobsite safety is not a hinderance to jobsite efficiency when managed well. An online survey of Cal Poly students and alumni, as well as industry leaders was used in order to gauge the perception of safety in the construction industry. The survey was concerned with their perception of safety on jobsites they currently, or most recently, had worked on. Demonstrated below are the questions asked, as well as their charted results.

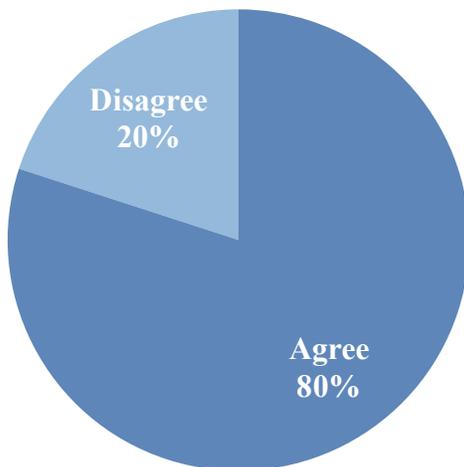
Survey Results



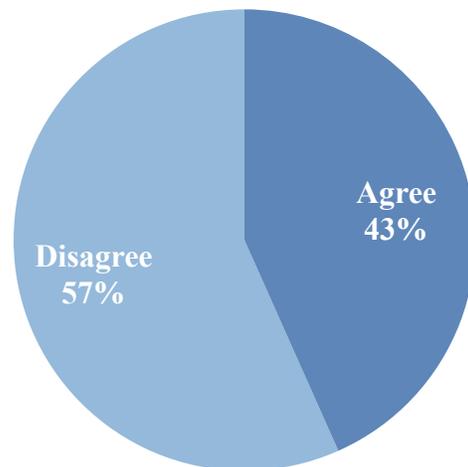
There is appropriate safety equipment on my job site



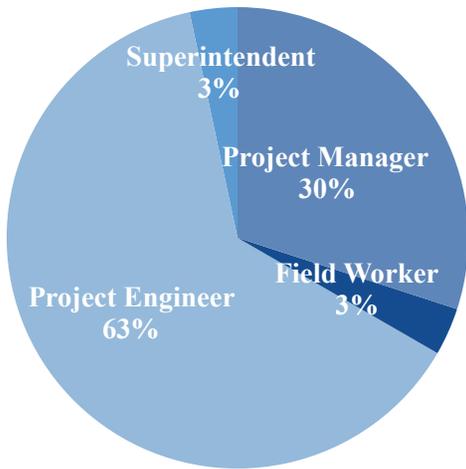
Safety Equipment is easily accessible on my job site



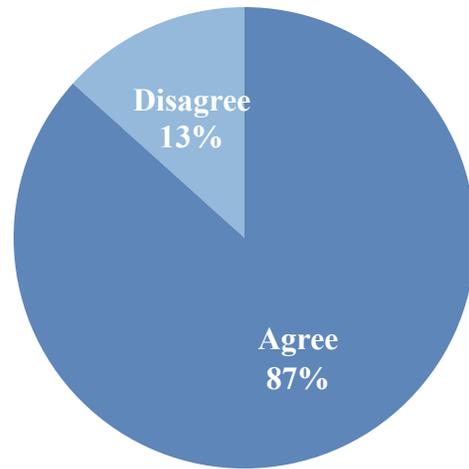
Safety equipment on my job site is inspected before each use



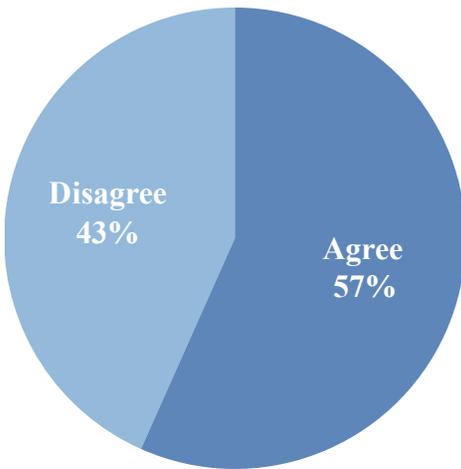
On my job site, field workers are able to bring all of the equipment they need to their workspace at once



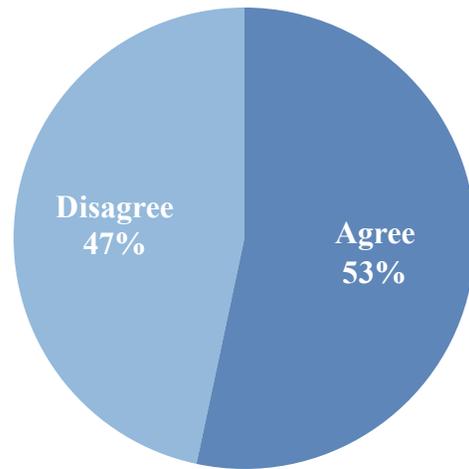
What is your position within your company?



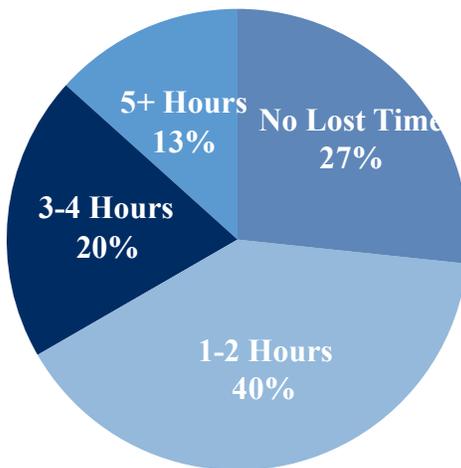
On my job site, safety equipment is kept in a Knaack box (or similar) in the field near the workspace



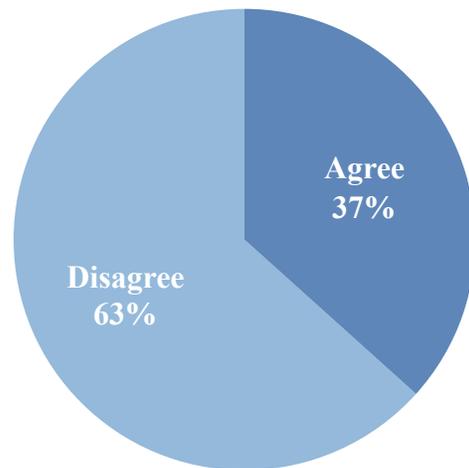
Following proper safety procedures slows down production in the field



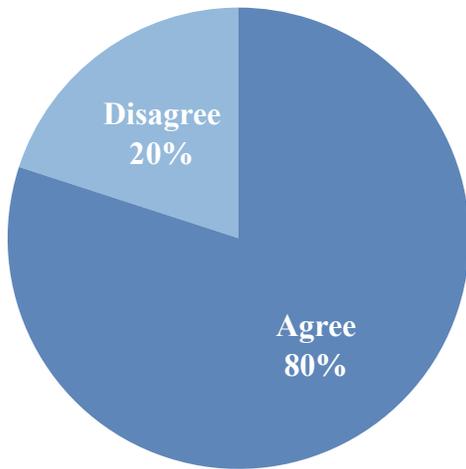
On my site we have lost time due to lack of proper safety equipment



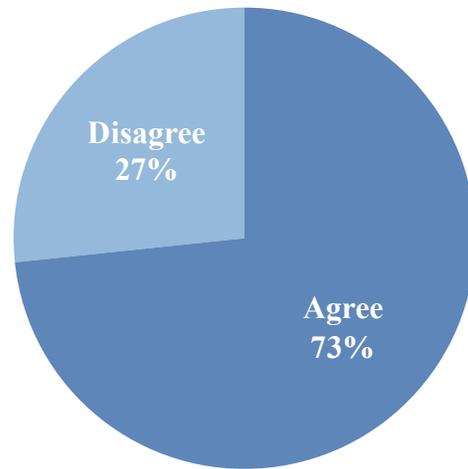
How many estimated hours per week are lost due to safety concerns?



It is cost prohibitive to individually provide safety equipment for every worker on our job site



When scheduling, I account for safe work practices in the field



In the construction industry, safety is prioritized over timeliness

Comments

The result of this survey questions highlights some issues in safety training, as well as estimating strategy. Survey results indicated that not only is safety a priority, but that it is a time-concern as well.

Jobsite Safety Practices

The survey appears to disagree with some of my research indicating that greater safety practices can lead to a more efficient jobsite. Responses to “following proper safety procedures slows down production in the field” were largely split between agreement and disagreement. This is not surprising due to the counterintuitive nature of this conclusion, but indicates that safety as a cause for increased productivity is not widespread knowledge.

Results of the survey indicate that many respondents have been on a jobsite that has lost time due to lack of proper safety equipment, despite the fact that an overwhelming majority respondents indicated that their jobsite has easily accessible, and appropriate safety equipment. Additionally, most respondents believe that it is not cost prohibitive to supply safety equipment to each and every employee. This suggests that improvements could be made in safety planning.

Most respondents indicated that on their jobsite, field workers use a Knaack box for storage of equipment near their workspace. The survey also indicated split opinions on whether or not it was possible for a field worker to bring necessary equipment to their workspace. These results suggest that distribution of safety equipment could be improved to better facilitate their worker’s needs.

Safe Estimating

Upon following up with some of the student respondents concerning, “When scheduling, I account for safe work practices in the field,” most of them did not actually consider safe work practices, but instead assumed that a cost database (RS means, etc.) would have take these into account already. This is quite an assumption to make when safer work requires more precaution, and thus in the short term can lead to a longer activity. Poor estimates can lead to fast-track procedures like overtime work, which have been shown to have a negative affect on safety. This is interesting when compared to “In the construction industry, safety is prioritized over timeliness,” as it suggests that while safety is a priority, most respondents do not have first hand experience in the field to consider safe practices.

Timeliness is vital in any construction project. Delays can activate red-flag clauses such as liquidated damages that eat into a contractor’s profits. As such, safety should be emphasized not only in the field but should be built into schedules to ensure that the project remains on time.

Limitations

The data gathered is an interesting look at perceptions of safety around the industry, but it does have significant limitations. The main concerns with the data are the perceptive nature of the responses, sample size, and survey design.

Perception vs. Reality

The data was gathered mostly using an online survey through Cal Poly students and graduates with construction experience. It is important to note that this is a survey about one's perception of the construction industry based off of their own experiences; the data is opinion based and not based off measured quantitative data. As such, some of the data is contradictory to the referenced literature.

Sample Size and Diversity

Because this is a survey of mostly Cal Poly students and alumni, it is not a representative sample of all types of construction workers. In the responses, it can be seen that this survey mostly comprises of entry level employees (project engineers) and lacks representation in upper-management as well as field workers.

Survey Design

Since this is mostly an agree/disagree response style survey, there could be a bias towards agreement in the results. The responses gathered do not allow for respondents to clarify their responses, which became clear in follow-up discussion with surveyed student individuals. As seen in background research, unsafe practices often go unreported; this applies not only to the field workers on a respondent's site, but to the respondents themselves.

Future Research

Future research is required to make greater conclusions about jobsite safety practices in regards to efficiency. It would likely be beneficial to the industry to put a greater stress on safety practices in the workplace as well as in the classroom. In an educational setting, it could be beneficial to place greater emphasis on safe practices in estimating. For contractors, safety and efficiency could possibly be improved with an increase or systematic distribution of safety equipment.

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