

The Optimization of Financial Investment in Project Safety Practices

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Abstract

This research paper explains the notable benefits to pursuing a comprehensive safety plan complete with the most cost-effective safety practices in the industry. Through communication with environmental health and safety professionals within the construction industry, it was determined that certain safety practices are deemed essential on any active jobsite. Enforcing mandatory jobsite safety training to all individuals entering a jobsite serves as the first line of defense when attempting to protect individuals and mitigate risk. This educational and effective safety practice highlights the potential safety concerns of a jobsite while also mitigating contractor liability if an accident were to occur. From a field management perspective, introducing a “Crane Boss” or other equivalent critical scope management position was viewed as a helpful addition for minimizing risk. Such a position would be responsible for managing the coordination and execution of high-risk scopes such as crane picks or concrete pours serving to decrease the potential for issues when addressing these scopes of work. Both of these safety programs provide great potential for cost savings and other lucrative returns while requiring a small investment of resources. For these reasons, such implementations are considered essential additions to any productive and successful jobsite.

Keywords: Budget, Safety, Risk Management, Optimization, Communication

Introduction

Prioritization of safety is a common theme among workplaces that is especially important within the construction field. While its importance is often discussed, some safety practices are pushed to the wayside when stressful schedules or budgets are realized. A recent survey of industry members found that more than half feel that safety takes a backseat to productivity on a jobsite (Smith, 2017). This

research paper intends to analyze the financial benefits of investing in and adhering to safety practices within the construction field. This is further defined by studying the results of consistent dedication to a safety methodology and the benefits that arise as a result. The study of this topic will be realized through an analysis of different jobsites and their different safety plans in relation to practices and the associated finances.

Through communication with safety and project management professionals as well as in-depth analysis of selected job's safety procedures, the most effective safety practices can be identified.

Literature Review

The intention of this literature review is to have an in-depth understanding of the industry's current perspective on safety programs and their potential benefits. Construction's ongoing relationship with maintaining safe jobsites is integral to the success of the industry as the professionals therein always strive for improvement. The below analyses provide an overview of safety within the construction field and the possible benefits of implementing a full "buy-in" from all individuals onsite.

Involvement and Cooperation of Upper Management in Safety Practices

First, the suggested safety practices to be implemented on any given site must be consistently supported and enforced by the jobsite's management. This involvement of project management professionals in safety procedures provides the confidence for all other project members onsite to "buy-in". This concept helps to integrate the selected safety practices into the everyday work setting by confirming that these steps are not only encouraged but also expected and enforced by everyone at the jobsite. The National Safety Council claims a notable potential for savings through early adoption of safety practices as the indirect costs associated with workplace injuries are nearly 3 times the direct cost of adopting and enforcing an effective safety program (National Safety Council 2021). An important theme highlighted in this study was the prioritization of continuous improvement through maintaining a line of communication between management and the field. This communication allowed for prompt reporting of potential issues to absolve unsafe situations before issues could arise.

In order to encourage independent reporting among field workers, a project must ensure that all individuals who enter the site have the same understanding of expectations. This goal can be accomplished through generating a single, jobsite-specific safety presentation that addresses all of the major hazards that could be encountered onsite. OSHA suggests that this presentation be delivered to each individual prior to starting work to ensure that nobody enters the site without a confident concept of the hazards that may be encountered. Now educated on the safety hazards that could arise in the field, each laborer should be encouraged to point out and report safety issues to prevent injuries to their fellow worker and the potential for work to be halted. These practices can be generated and integrated into any jobsite with minimal cost involved, making them extremely accessible and near mandatory for a safe jobsite.

Safety Practices Being an Intelligent Investment on All Jobsites

Safety programs and practices are rarely seen as a priority when considering the greater picture of expansion within the construction industry. As a result, it's often the case that environmental health

and safety programs (EHS) see cuts during recessions and occasional growth and expansion during a booming economy. This perspective neglects the viable potential of financial success through a reliable and productive safety program. This success is realized through the variety of positive business-related outcomes that come to fruition as a result of maintaining consistently safe work. Below is a study that was completed observing some potential benefits of a successful safety plan which is seen in Figure 1.

Business Value → EHS Function ↓	Profit	Productivity	Compliance Risk	Reputation /Image	Cost Containment	Time to Market	Shareholder Value	Customer Service	Market Share
Training	X	X	X		X	X	X		
Waste Reduction	X	X	X	X	X		X	X	
Environmental Permit Compliance	X		X	X	X	X	X		
Studies, Audits, Reports	X		X	X	X		X		
Safety Compliance	X	X	X	X	X	X	X		
Remediation	X	X	X		X		X		
Energy Efficiency	X			X	X		X		
Safety Committee		X	X		X				
Security		X	X	X	X		X		
Pollution Prevention	X	X	X	X	X		X		X
Recordkeeping		X	X		X				

Figure 1: Identifying the linkages between EHS and business values (Huan YH et al, 2007)

Through this study it is easy to understand how EHS programs can positively influence a business, yet investment in safety programs as a means to increase productivity remains a controversial idea. The figure demonstrates that further investments into topics for increased improvement such as training, waste reduction, and safety compliance have direct positive impacts on numbers closely tied to a jobsite's success such as profit and productivity. Beyond this there is obvious financial savings from avoiding unnecessary violation fees from OSHA while maintaining a low experience modification ratio (EMR). Observing the correlation between safe contractors and their success, it is worth noting that the majority of contractors within Engineering News Record's top 10 boast an EMR well below 1.0 which is considered average (ENR, 2010). Incentives to maintain a low EMR are difficult to ignore as a low ratio leads to lower insurance premiums, a stronger reputation, and overall higher chance of earning new work from owners who want to see their product delivered safely and with the utmost quality.

These points draw the attention of both management and laborers as to why safety is a worthy investment for today and for the health of the company in the future. Management's goal of promoting and advancing the company is realized through the potential for increased profit, productivity, and the pursuit and winning of new work in the future. Laborers see an employer with a reputation of respecting one's well-being and future through embracing safe and conscious practices around the jobsite. Together, these visions point towards a successful future in which a mutually beneficial relationship is founded throughout a company vying for financial achievement.

Methodology

Having identified the integral position a successful EHS practice holds within a project, one must consult those currently implementing these practices in the field to understand the most effective. To achieve this, semi-structured personal interviews were conducted with a variety of EHS professionals among the top general contracting firms in the industry. The semi-structured format of these interviews assisted in keeping the topics organized while also allowing for some extension when a particular topic of interest was covered. The pre-selected questions are detailed below:

Interview Questions

- What safety practices do you see on the jobsites you are responsible for? (Please name specific examples and details)
 - Of these practices, which do you feel are the most effective or influential?
 - Conversely, do you feel any of these are ineffective or unnecessary?
- Are there any safety practices you would like to see implemented on your jobsite that aren't already present?
 - If yes, would there be a significant cost associated with adding this system?
- What are your thoughts on the following statement: "On jobsites the most important factors are cost, schedule, quality, and safety. The first 3 must be balanced on any successful jobsite, yet safety cannot and is not ever compromised."
 - Do you feel this is the case on jobsites you've seen?
 - Do you feel safety resources are at times limited or even cut in favor of other items?
- If your jobsites require mandatory safety training for all individuals onsite, do you feel this is effective?
 - What is your perspective on the cost/benefit analysis on mandatory safety training?

The information from these conversations was compiled and compared to best understand what safety methodologies are in-place on jobsites and their associated effectiveness. The qualitative information is broken down by safety program below.

Results and Analysis

Through speaking with industry professionals, it became clear that large jobsites often maintain similar safety practices with occasional variations dependent on site conditions. The practices outlined below were discussed at great length due to their popularity and arguably essential implementation on jobsites. The utilization of these systems allows for increased safety standards while simultaneously decreasing safety concerns for individuals onsite.

Mandatory Jobsite Safety Training

A consistent topic that remained at the forefront of each interview was the analysis of mandatory safety training for all individuals onsite. This blanket training served as a simple overview of all possible dangers found on the jobsite. Beyond simple, common hazards, EHS professionals pointed out the value in understanding the particular dangers present onsite at that current time. This up-front knowledge demands the attention of potentially inexperienced individuals on the jobsite and provides

the knowledge necessary to navigate any issues. Conveying this information is integral to ensuring those who enter the jobsite are able to protect themselves without disrupting work occurring currently.

The cost-benefit analysis of this regular safety practice requires one to consider the cost of lost work time due to the meeting alongside the company safety representative necessary to conduct the training. Given the EHS professional's billing rate and the work not being completed during the safety meeting, there is potential for significant cash losses through each jobsite safety training. While unattractive, the greater potential cost due to contractor liability on a jobsite as a result of injury is much more daunting. According to the National Safety Council, the average cost of an injury requiring medical attention was \$39,000 whereas a fatality averaged \$1,500,000, numbers that far surpass the minimal up-front cost of safety training for all individuals entering a jobsite (National Safety Council). Beyond the intimidating costs of not enforcing a mandatory safety training on the jobsite, establishing a training and an associated sticker of badge that proves attendance further solidifies jobsite security. All individuals present on the jobsite must have the required badging acquired from completing safety training to complete work onsite. The multitude of positives associated with enforcing a mandatory jobsite safety training for all individuals present onsite far outweigh the initial costs of integrating and managing such a system.

Crane Management

Cranes are often considered some of the most expensive and high-risk equipment to be commonly utilized on a jobsite. Regularly picking multi-ton structural pieces into precarious locations on a structure requires intense coordination with little-to-no room for error. With such low tolerance for error mistakes tend to be catastrophic. OSHA calculated an average of 71 fatalities per year in 1993 (OSHA). This number is especially inexcusable considering the high attention to detail expected when working with such advanced equipment.

Given the high-stakes of working with cranes, interviewed EHS professionals suggested a safety precaution referred to as the "Crane Boss" when working onsite. This position would be responsible for all crane coordination related activities to ensure there is no miscommunication that results in property damage or injury. As seen in the graph below, this position has a high probability to greatly reduce the "In Operation" and "Operator Error" portions of crane accidents, comprising nearly 40% of all crane incidents.

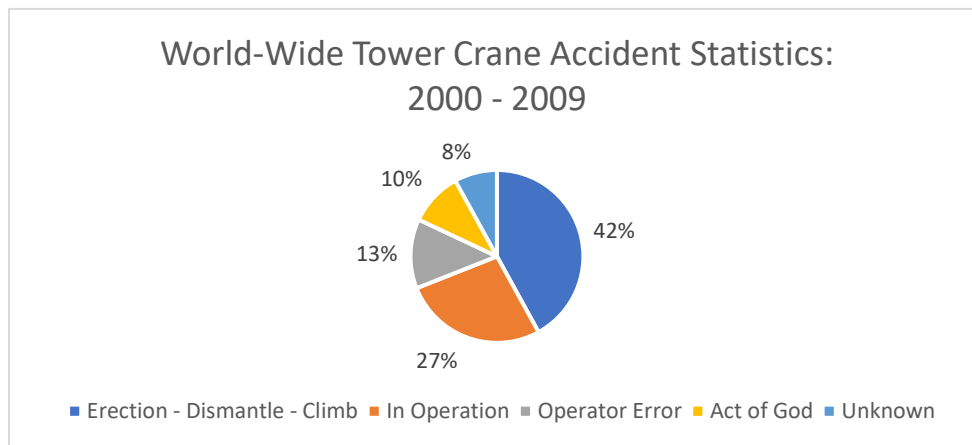


Figure 2: Data regarding Tower Crane Accidents from 2000 – 2009 (United States BLS, 2019)

Such a concept should be applied to high-risk activities onsite in an effort to minimize the opportunity for error. Examples of such activities would be the aforementioned crane operations, large-scale concrete pours, or hazardous jobsite deliveries. It is critical to maintain total control of potentially dangerous situations on jobsites to ensure the safety of all individuals participating. The upfront costs of these management practices are dwarfed when compared to the potential fees associated with severe injuries or even death.

Conclusion

Each contractor employs its own systems in order to maintain a reasonable safety standard while attempting to maximize productivity and minimize costs. This balance is tediously managed based on which safety practices are viewed as the most worthwhile. Through interviewing multiple industry professionals, it seems that the most essential and cost-effective system would be enforcing mandatory jobsite safety training for all individuals entering the jobsite. The value added as a result of this relatively simple process is greatly minimized risk through avoiding potential injuries while also mitigating company liability if an injury does occur. Beyond this often in-place safety system, the concept of a “Crane Boss” or other critical scope management position also boasts large potential safety benefits. Prioritizing attention towards the high-risk scopes of work assists in mitigating the potential for detrimental mistakes to derail jobsite schedules and budgets. The benefits of these safety systems far outweigh the potential cost of implementation and should be considered an industry-wide expectation on jobsites.

Future Research

Potential for future research exists in that there is always room for continuous improvement when analyzing safety. The two practices outlined in this paper are prominent examples in the effort to highlight the most effective or essential practices, yet they are far from the only options. A next step in this effort would be to analyze a sizeable collection of jobsite budgets, their safety programs, and the associated injuries or violations that occurred. This task would be a large undertaking as many contractors are private when discussing jobsite finances. However, completing this scope of work in a research paper format would create an opportunity to increase the safety standards throughout the construction industry by identifying additional effective safety programs to be implemented on jobsites.

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