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Safety Training Approach: Evaluation of the Effectiveness Towards
Achieving a Zero-Accident Workplace

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Abstract
A zero-accident working environment can happen by having an overall safety program which coincides with the philosophy. This overall safety plan comprises of safety policies which can be implemented by conducting Safety trainings. This is adopted in construction companies that had been showing excellent results lately. The success is because the program is being monitored and results had been reincorporated to the program. However, there are accidents that occur every day and this study has attempted to find out from individual construction professionals that how much time and effort is put into monitoring safety and increasing awareness. A questionnaire survey was conducted from the local construction companies of South Florida. The questionnaire inquired about company safety goals, safety meeting, OSHA (Occupational Safety & Health Administration) citations, health & safety orientation, program/manual and follow-up system. Respondents were mostly owners, supervisors, project managers and superintendents. Majority of companies do have a safety program which involves education and safety prevention. South Florida is becoming more and more involved in a national movement towards zero accidents in order to have an effective zero accident policy. However, some organizations argued that time constraints and cost were the biggest obstacles for ensuring safety, most companies with less than fifty (50) employees do not have a set formal safety standard. It is recommended that construction companies need to set aside monetary resources and time to create and implement employee safety training. It is also recommended that management must lead by example by setting the standard on how employees must act safely on the job site.

Keywords
Zero Accident, Safety Training, Occupational Safety & Health Administration

1. Introduction

Construction is considered to be a risky endeavor because of the high frequency of work-related fatalities and serious injuries. According to the Bureau of Labor Statistics (BLS, 2013), the number of fatal work

injuries in the U.S. was reported as 4628 in 2012, and 806 of these were recorded in the construction industry, while the total number of non-fatal cases was 905,690 in the same year with 71,730 of those recorded in the construction industry.

Safety training involves the use of, the right tools and the right safety information which add up to a safer work-place, and training is the key to bringing it all together. To instill an effective safety training culture in the workplace there are generally a series of steps to that should be followed to ensure success. The first step would be to decide what training your organization needs. An individual who is in-charge of putting forth safety training should identify the skills and knowledge needed for people to be able to do their job in a safe and healthy way. These skills should be compared to people's current skills and knowledge and correct safety training should close those gaps between what is known by the employee and what employees need to know regarding safety. The next step is where an organization will decide on the training priorities. The top priorities would include where the lack of information and or/training might result in serious harm, and those which benefit the largest numbers of workers. The third step is where an organization would choose their training methods whether it is coaching, on-the-job training or training in the classroom. The fourth step is where and how the organization delivers the training, this will attempt to ensure that the information is easy to understand and try to use a variety of training methods to deliver the message. The fifth step is where the organization checks to see whether or not the training has worked. Step five will attempt to answer the questions on whether or not employees understand what is required of them and whether or not the training has actually worked.

What is the concept of a zero-accident work environment and can a zero-accident work environment be placed into practice within an organization? The main philosophy behind a zero-accident workplace is to respect human life. The concept of a zero-accident workplace does not state that zero accidents will occur but merely that a zero-accident environment is the ability of all workers to take the necessary steps towards preserving and implementing safety and health so that no individual gets injured on the work site. The basic premise is to keep accidents to a minimum through training and to have the knowledge to act upon those accidents when they do occur. The concept of zero accidents in the workplace is based on three basic principles: The principle of zero accidents means to achieve an accident free workplace by detecting, understanding, and solving all hazards in everybody's daily life as well as potential hazards existing in workplaces. The principle of preemptive action means to prevent all accidents by detecting, understanding, and solving all hazards in everybody's daily life as well as potential hazards existing in workplaces and work to create a brighter and more vigorous workplace with zero accidents and zero diseases as an ultimate goal. The principle of participation means to make a concerted effort by managers, supervisors, staff, and workers to detect, understand, and solve potential hazards existing in workplaces. It requires the voluntary effort and commitment of all those involved for problem-solving.

2. Literature Review

Implementation of a zero-accident workplace involves two important points in order for zero-accident to be achieved. First, there must be a positive attitude from top management; the starting point of safety and health begins with senior management to respect every single employee and to ensure no injuries. A positive attitude from the top will flow down to every supervisor, foreman and labor. Top management must first take the initiative in changing the way of thinking regarding zero accidents, it is also extremely important for line managers and supervisors to lead by example by integrating safety and health activities into day-to-day work, by making safety and health part of line management. Secondly, there must be complete management of the safety and health system by line managers and supervisors while implementing a zero-accident culture. Organizational issues consist of the firm's structure, middle management's commitment to safety, and the effectiveness of safety trainers in improving the quality of training sessions. Sicilia and Lytras (2005), and Pham and Swierczek (2006) assert that a supportive firm structure results in knowledge transfer and motivates workers to learn quickly and capture the necessary

information in an effective manner in safety training sessions. According to Jaselskis et al. (1996), and O'Toole (2002), middle management's commitment to safety training results in experiencing lower injury rates and helps with improving a company's safety culture (Demirkesen & Arditi, 2015).

Workplace health and safety training is considered by many employers to be an ethical issue as well as an OSHA (Occupational Safety & Health Administration) compliance issue. The main goal in workplace safety training and health safety training has to be design, develop and deliver custom safety training to every employee and this is achieved by understanding how a safety and healthy workplace benefits workers, families, businesses, and the community. Knowing the responsibilities for keeping a safe and healthy workplace; Developing a system for organizing safety and health efforts; Knowing the laws and regulations for the work; Addressing specific workplace hazards and have regular meetings; Cultivating a safety culture with mutual respect and open communication; Celebrating accomplishments and defer OSHA inspections with recognition events; Finding out the best solutions to safety and health problems; Asking questions about workplace safety and health etc. Concerning the qualifications of a trainer, OSHA standards mandate that a trainer is considered to be qualified if he/she has previously completed a training program on the subject to be instructed. Furthermore, these trainers are expected to possess relevant academic credentials and teaching experience (OSHA, 2013). Safety training is implemented by having an overall safety program which coincides with a zero-accident working environment. These safety training features include accident prevention and safety promotion, safety compliance, accident and emergency response, personal protective equipment, safety practices, equipment and machinery safety, chemical and hazardous materials safety, workplace hazards and employee involvement. An effective training program coinciding with a zero accident working culture can reduce the number of injuries and deaths, property damage, legal liability, illnesses, workers' compensation claims, and missed time from work.

There are several methods that can be used to train workers in construction safety. Kraiger (2003) highlighted four methods, namely computer-based training which is flexible, cheap and allows easy-access; team training which aims to practice with other teammates' tasks, roles and responsibilities in order to increase understanding; cross-cultural training which helps with enhancing sensitivity and flexibility towards cultural differences; and corporate training which consists of distance learning and specialized courses. McMahan et al. (2010) encourage the use virtual environments as a strategy in worker training because they found that virtual environment applications improve worker training in pre-inspections of haul trucks and operational procedures of conveyer systems. Effective accident prevention is all about leadership. Traditionally, many leadership activities took place at the corporate offices and safety records were confined to company files. Hendrik van Brenk states that, "At Skanska, we believe in communicating performance both on accidents and on those activities that prevent them. We think the key is to be transparent with our work force and subcontractors. The more insight we share with employees and contractors about what we should be doing in terms of scaffolding, tools or work equipment, and the more we inspire each worker to comply with the rules and regulations because they recognize the reasons behind them, the more likely we are to achieve our goal of zero accidents ."

The U.S. Army Corp of Engineers released a paper explaining zero accident programs and showing the insurance costs associated with injuries on construction job sites throughout the United States. The construction industry in the United States accounts for approximately 10% of the GNP with an annual dollar volume of about $450 billion. According to the paper, 5 percent of the nation's workforce is employed in the construction industry, yet that 5 percent experiences a disproportionate 20 percent of all traumatic occupational fatalities and 12 percent of the total number of disabling injuries. This corresponds to 6 to 10 fatalities on construction sites every working day throughout the United States. Estimates of the total cost of injury for the $450 billion U.S. construction industry range from $7 billion to as high as $17 billion annually. The Army Corp of Engineer uses these numbers to show that what is happening in the construction industry needs to stop and a zero accident culture needs to be implemented immediately. In order to establish a zero accident culture, employees should clearly understand that the goal is to eliminate injury, not hide injury for the appearance of reaching zero. The U.S. Army Corp of Engineers determined that the better the companies safety results become, the lower the recordable insurance rate will

be. A significant safety attitude change in the worker comes with the goal of zero injuries. The concept is a socially responsible management attitude toward the ongoing health of a companies' most important asset, its employees. More and more owners and contractors are realizing that zero lost workday injury is achievable, and they are taking that first step telling their employees that zero injury is the expectation.

There are many safety and health training programs available to construction industry workers, but there has been little investigation into the effectiveness of such programs. Still, the limited evidence suggests that there are benefits from implementing such training. One study, conducted to assess the effect of first aid training on occupational safety and health behavior in the construction industry, found that the intervention appeared to reduce workers' willingness to engage in risky behavior at work and reduced their willingness to tolerate unsafe conditions (Lingard 2002). In summation, the construction industry has always been and will remain a dangerous business. Statistics show that despite companies' best efforts, there will be accidents and even fatalities. However, the numbers clearly show that through constant awareness, great achievements can be accomplished. The article explains that with the proper leadership and open lines of communication accidents can be minimized and prevented. It is the active awareness of your environment that can help decrease job site accidents and unnecessary incidents that involve injury.

3. Research Methodology

To gain a wide range of data from across the field surveys were sent to a number of companies via e-mail and hand delivered to construction managers and site superintendents. The surveys were filled out by mostly smaller general contractors. Questions about OSHA compliance, OSHA citations, and the safety measures taken by their companies were the part of questionnaire. Zero accident culture has been around for the last 10 years and day by day it is getting more recognized and applied in the construction industry. There are several safety policies in construction companies that have been showing excellent results lately. The success is because the program is being monitored and results had been reincorporated to the program fixing flows and problems only perceptible with the application of the training in real situations. The research is focused in the area of South Florida and it should be noted that there are small but important factors that make it work depending on the area where the plan will be implemented.

4. Data Analysis and Discussion

The respondents mostly belong to management area (owners, supervisor, project managers and superintendents), thus diminishing the impact of the research due to overshadowing the version labors and superintendents. There is approximately uniform distribution of the companies' type regarding being private, public or both. It can be interpreted from the chart that most of the companies in this research have 0-50 employees (Figure 1). A lot of research published all over United States is limited to big organizations; however, they do not provide much information about small general contractors or subcontractors. These are the types of companies who perform most of the work in South Florida. This is one of the reasons for focusing on companies with less than 50 employees.
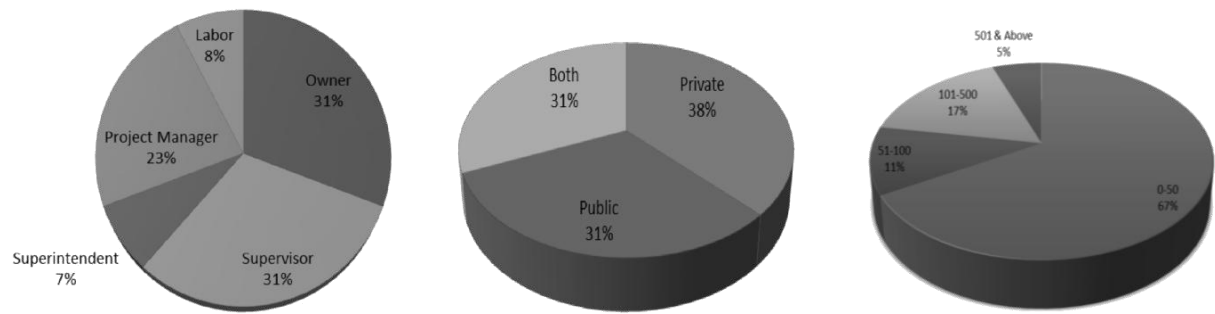
Figure 1: Composition of Respondents (Job Description; Public/Private Sector; No. of Employees)

Out of 20 companies, 15 (75%) have not received any citations from OSHA agents in the last three years (Figure 2). Companies in general reported that they have not received citations from OSHA. This is not an indicator of the safe behavior of the companies instead shows how OSHA has not enough inspectors to perform site visits more frequently or to check if general contractors and subs follow all requirement demanded by OSHA. 90% of the companies have safety goals and objectives formally stated and established (Figure 3). Most of the companies surveyed had safety goals and objectives. The problem with this is that those objectives usually do not last long or are cut short in the proximity of deadlines when they can be forgotten. Safety issues in small companies tend to be perceived as a luxury that needs a lot of research that general contractors hesitate to engage in; because for the company it is probably easier to pay for injuries or even unemployment than bring in a safety manager or pay for outside consultants.
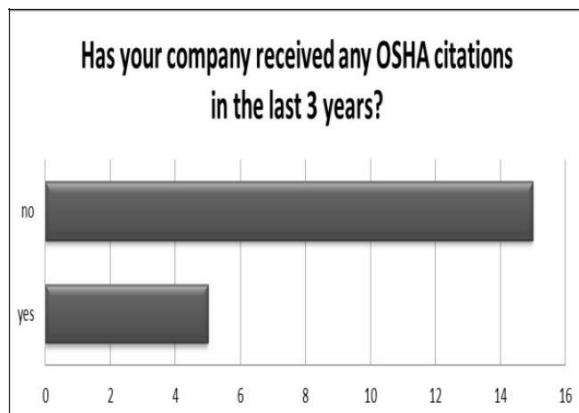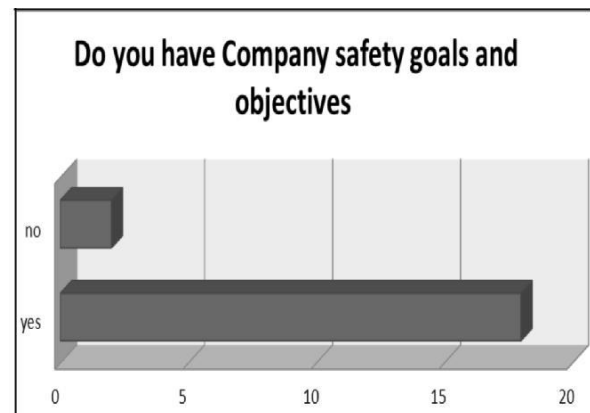

Figure 2: OSHA Citations

Figure 3: Safety Goals and Objectives

13 companies out of 20, have a written manual for safety program being taken into account in the job site (Figure 4). 18 companies out of 20 hold regular safety meetings for supervisors/safety managers in variation from daily to annually (Figure 5). Most of the companies have handwritten documents about health and safety programs that put in their file when they sign their company contracts. Including these documents is a plus but how these programs are implemented, enforced, and followed up is the main idea behind creating a zero accidents culture on the job site. Even though the percentage of performing safety meetings for supervisors and employees is high for small companies; it is common to do this meeting not just for safety purposes but also to increase progress of the project at hand. As per the need safety aspects are discussed or safety issues that need to be addressed are usually put into this meeting and call it a safety meeting. In large companies on the other hand, safety is a very serious matter. They perform safety meetings every week for managers and supervisors. This is a time when they discuss past safety mistakes and also update the staff on safety procedures and OSHA regulation updates.
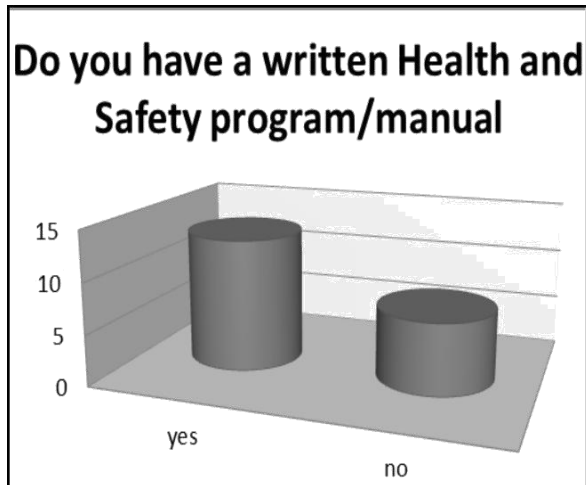
Figure 4: Health and Safety Manual

Figure 5: Safety Meetings

During safety inspections 40% of the companies have no follow up system to track items identified (Figure 6). 16 companies out 20 have safety program for new employee to make them warm up for the job (Figure 7). Most of the small companies studied do not have a clear follow up system to track items identified during safety inspections. This responsibility falls on supervisors which usually are more involved in production and staying on schedule than rechecking safety violations.

Figure 6: Followup System

Figure 7: Health and Safety Orientation

16 companies have a safety meeting being held regularly for the employees (Figure 8). Surprisingly, 8 companies out of 20 have no certified safety manager in their job site (Figure 9). One important factor found in is that most small companies have a certified safety manager; however, most of the time it is the owner of the company or an employee that has been working in the company for a while. It is assumed that this is because smaller companies do not have the budget to have somebody in charge of only being the safety manager. From the financial point of view the cost of injuries may be smaller than the salary for a safety manager.

Figure 8: Scheduled Safety Meetings

Figure 9: Certified Safety Manager

9 companies out of 20 feel that OSHA regulations are too strict to be followed (Figure 10). Companies in general reported that they have not received citations from OSHA and also, they believe that OSHA regulations are fine. It is believed that this is not an indicator of the safety behavior of the companies instead shows how OSHA has not enough inspectors to perform site visits more frequently or to check if general contractors and subs follow all requirement demanded by OSHA.
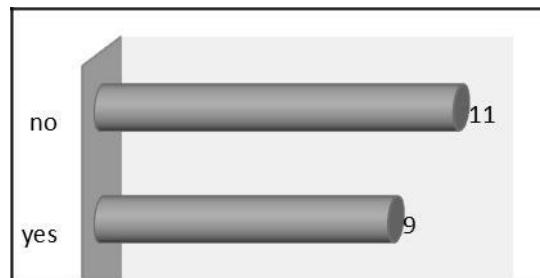

Figure 10: OSHA Regulations Compliance

5. Conclusion

In summation, construction companies need to set aside monetary resources and time to create and implement employee safety training. Safety training is something that needs to be implemented throughout the industry to every small company, general contractor and subcontractor because accidents are a part of the environment. Most companies with less than 50 employees do not have a set formal safety standard the main reason behind this are monetary factors. It is also determined that in order to have an effective zero accident policy management must lead by example by setting the standard on how employees must act on the job site. From a management point of view zero accident training is a matter of cost vs. benefit. Unfortunately, safety training is sometimes viewed and perceived differently among people in the construction industry. Professionals in safety training should work not just in developing plans and programs, but also in getting employees to participate and gain safety knowledge through incentives. Management should focus efforts toward zero accident cultural analysis and how workers are better receptors of the information that is passed along to them. Management should let the employees know that even though a certain situation might appear to be safe that it should be checked and rechecked to ensure a zero-accident culture is achieved. South Florida is becoming more and more involved in a

national movement towards zero accidents. This is happening mainly in large corporations where there are more financial resources available rather than in small companies where funds for safety training are not a top priority. Safety training is applied by workers if they have a complete understanding of what the purpose of the particular safety program they are involved in.

Zero accident training should be encouraged in all phases of the project, especially in proximities to deadlines where production becomes the only purpose of the work performed. It is recommended that in future studies, the matter of research is the worker and how his culture and own behavior affects safety training. The smaller the construction company, the less amount of emphasis is place on a zero-accident safety culture.

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