The Effectiveness of the Safe Work Practices Safety Program

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Abstract

All too often organizations and employees suffer unnecessarily from the effects of preventable workplace injuries. This study was conducted to determine the overall effectiveness of a behavioral based safety program known as Safe Work Practices in the distribution facilities of ORS Nasco, Inc., which operates nationwide. A substantial reduction in the rate of injury would indicate effectiveness of the program. This study was also conducted to find what variables contribute to an increase in the rate of injury, such as work hours. Data including injury rate and work hours were collected over a four-year period and analyzed for the purpose of this study. The findings concluded, for a myriad of reasons, there was likely not a significant reduction in the rate of injury after implementation of the Safe Work Practices program. However, exploratory analysis provided solid evidence that the number of hours worked at a given facility may be an indicator of the likelihood of injury, ultimately contributing to the necessity of the program. Thus, recommendations for future research were included near the end of the study.

Introduction and Statement of the Topic

Statement of Purpose

The purpose of this study was to determine the effectiveness of the Safe Work Practices safety program in the Distribution Centers of ORS Nasco, Inc., in Tulsa, Oklahoma. The study was conducted by implementing an original workplace safety program and examining its impact on the number of injuries in the workplace. For this study observations of the numerous facilities were performed by observing the rate of injury and the observations were from January 2008 to January 2011.

The study facilitator hypothesized if a consistent and unified safety program was introduced to employees, the company would experience a significant reduction in work-related injuries, thus reducing lost productivity and worker’s compensation claims, while raising the accountability of employees. As a result, ORS Nasco, Inc. would experience expansion in productivity with fewer barriers related to safety issues.

Organizational Context

Setting of the problem. ORS Nasco, Inc. operates as the largest pure wholesale industrial distributor in North America. Beginning as two separate companies and originating in the 1940’s, Nasco and Oklahoma Rig and Supply eventually combined as one organization. Nasco began as a publicly held welding distributor with 18 store locations. Oklahoma Rig and Supply primarily began as a family-owned oilfield distributor in Muskogee, Oklahoma that expanded operations from a single facility housing all corporate functions and a large distribution center to construction and industrial markets. Nasco acquired Oklahoma Rig and Supply as a bolt-on company in 1999 and through a merger ORS Nasco, Inc. was created. The merger intended to provide a national platform to offer the large product portfolio of Oklahoma Rig & Supply, through the geographic locations of Nasco.

Newfound ORS Nasco, Inc. designated its corporate headquarters in the Oklahoma Rig and Supply facilities in the city of Muskogee. The year 2005 brought about more changes as members of the ORS Nasco, Inc. senior team and private investment firm, Brazos, purchased the company, which ultimately designated Tulsa, Oklahoma as its central location with eight distribution centers. Following three
years of significant growth, ORS Nasco was sold to the wholesale office supplies distribution giant, United Stationers Incorporated (USI) in November 2007. Since the sale, ORS Nasco, Inc. has remained an independent business unit with its own leadership, under the USI umbrella. With the new financial support from USI, ORS Nasco began an aggressive distribution expansion and currently consists of 19 distribution centers in 15 states while maintaining two corporate offices in Oklahoma. The company is presently operated by a two-level senior management structure. (See Figure 1)

![ORS Nasco Executive Leadership](image)

**Figure 1** Executive Leadership

ORS Nasco’s goals and strategy are stated in its vision, mission, and value statements. As illustrated in Figure 2

![ORS Nasco Vision](image)

**ORS Nasco Vision**

“Achieve exponential growth through innovation to benefit our partners.”

![ORS Nasco Mission and USI Core Purpose](image)

**ORS Nasco Mission and USI Core Purpose**

“Excelling our Partners to Succeed”

![ORS Nasco Values](image)

**ORS Nasco Values**

- **Nouns** – Our competitive advantage
- **Accountability** – Ownership of the results of our actions
- **Arthritis** – Innovation in the face of change
- **Partnership** – A commitment to align individual goals with common objectives
- **Empowerment** – The right and responsibility to take action

![ORS Nasco Values](image)

**ORS Nasco Values**

and Values

The ORS Nasco, Inc. mission is primarily focused on the success of partners including associates, customers, suppliers, and the surrounding community. The preceding diagram represents the company’s strategy of “winning from the middle,” which places vast importance on pure wholesale business where the wholesaler acts as a middle supplier between the manufacturer and the retailer that eventually sells the product to the customer. The uniqueness of this strategy rests in ORS Nasco, Inc. acting as a true business partner with the supplier and the customer, thus allowing the company to accumulate buying volume power to engage in direct buys at advantageous pricing. This ultimately allows customers to conduct purchases in smaller quantities to supply their own stores. Benefits of such a system include reduced capital and carrying cost, as well as permitting the customer to carry a large portfolio. Further, while providing a financial advantage to both supplier and customer, the supplier is provided the opportunity to receive product from a broader market, which ultimately allows the distributor to compete with much larger companies.

The ORS Nasco, Inc. vision continues support of the partner-centered theme and declares exponential growth through innovation as an additional incentive to partners. This refers to the vast array of services offered by ORS Nasco, Inc. to continually support the customer, in addition to simply selling product. Examples of these additional services include web hosting, online cataloging, online sales, financial services, and product warranty support. These services, when bundled together, allow customers to compete with an enhanced market strategy and platform that rival any competitor.
ORS Nasco, Inc. values places perpetual focus on the associate, or employee, to continue the partner-centered relationship. These specific values set the expectation of the ORS Nasco, Inc. associate and leadership, essentially defining these characters as a unique competitive advantage. Both associates and management alike are expected to exhibit accountability, agility, and empowerment through their interactions to further bolster the company’s success. This value is more than a statement, as it proposes that a competitor can duplicate the geographic locations, product lines, marketing materials, and web sites, but the people cannot be duplicated, thus making the associates the most valuable player of the company.

While very sound from a strategic position in regards to business and operating plans ORS Nasco, Inc.’s history of mergers, owner, and leadership changes developed a culture plagued with conflicted policy, training, and overall inconsistency. The majority of resources related to training and development were centralized to the corporate offices, lacking an objective view of the organization. Dysfunctional operations included the geographically diverse distribution centers that employed more than half of the associates in the organization. Consequently, as the distribution centers comprised the majority of associates in the company, the division of 19 locations separated by thousands of miles led the company to minimal overall unity. Aside from diminished unity, a vital but absent component was the lack of an organized structured safety program or unified training in the distribution centers. This need was addressed in 2008, as the first implementation of a safety program, the Safe Work Practices program, was introduced as a solution.

Managers of the ORS Nasco, Inc. operations team internally developed the Safe Work Practices program as well as all training materials. A position of a dedicated safety manager was established to oversee the implementation and continual training process over the duration of the program. In the description of this particular position were obligations to obtain certifications in the areas of responsibility required by authorized providers in Occupational Safety and Health Administration (OSHA) qualified programs. This new safety manager essentially held responsibility of continually evolving the program to meet all requirements of the law in addition to the needs of the operations team.

Further, the distribution industry is under constant monitoring of the OSHA. Minimum requirements are established by OSHA 49 Community First Responders (CFR) for general safety in the industrial environment. OSHA maintains a steadfast eye on industrial environments as physical labor combined with powered equipment creates high risk for on-the-job injuries. Consequently, two specific goals were established in the development of the Safe Work Practices program. The first goal was compliance with the law via meeting the strict training standards and documentation required by OSHA 49 CFR. The second goal transcended meeting requirements as it intended to create effective training, knowledge, and tools to prevent injuries. The Safe Work Practices program was developed to flexibly adapt to specific environments to not only exceed industry requirements but to produce positive results with consistency over time.

History and background. Prior to 2008 no evidence of a formal or universal safety program could be identified in the history of ORS Nasco, Inc.. Interviews with two distribution managers with more than forty years tenure provided confirmation that no formal or consistent program had
ever existed to their knowledge. However, some managers did introduce safety elements in their operations, but they were generally limited to specific talking points in meetings with limited implementation of procedures. The lack of a formal safety program left the operations team with dismal safety performance. High worker’s compensation insurance, large medical bills, lawsuits, numerous state and federal agency audits, and fines for violations were constantly looming over the company.

The year 2007 proved a disastrous year as injuries reached an all time national high with 29 injuries, or 16% of the distribution associates. To further the company’s decline, ORS Nasco, Inc. was levied a $60,000 fine for an unsafe condition within the same year. Such poor records not only diminished the company’s accountability, but facility and executive managers could face personal liability for failure to comply with safety regulations and laws. This particular liability can lead to consequences such as fines, exposure to civil action, and even criminal prosecution in a case of proven negligence according to the severity of the violation. These reasons alone were enough to establish a viable and effective safety program. However, the most compelling reason was protection of the company’s most important asset, the associate. In October 2007, goals were created for a base safety program to be in place by January 1, 2008. The program was to be implemented in the Muskogee Distribution Center, which was the largest of the eight distribution facilities, employing 105 associates of the 190 associates in the operations team, companywide.

Upper leadership was sparse due to cost control through much of the company’s growth and transition phases from 1999 to 2008. During this period a single vice president presided over multiple groups within operations including the distribution centers. As growth continued, mid-level positions were added to absorb the workload and provide more singular focus to areas of the organization, thus, a director of operations position was established in October of 2008. The position owned responsibility for all distribution center operations and provided the platform to expand the safety program to the entire operations network over time. After successful implementation and positive results in the Muskogee operation of the Safe Work Practices program, a proposed expansion of the project beginning in 2009 was pending. The safety manager of Muskogee was promoted to the national safety manager and was handed responsibility to implement the safety program nationally. The Muskogee safety program was shared with some other facilities in 2008, however, there was no formal national implementation. By January of 2009, the Safe Work Practices program was officially implemented to the remaining seven distribution centers.

In August of 2009, an expansion project began which increased the distribution facilities from eight distribution centers to nineteen by the end of 2011. This would extend the implementation project at an aggressive pace to include the new operations and additional associates. Full implementation of the Safe Work Practices had an expected completion date of December 2011. Accordingly, the distribution centers were classified in two distinguishable groups with reference to the safety program. One group included the eight distribution centers that existed before August 2009, and were referred to as “Legacy Operations.” The other group included the eleven distribution centers opened after August 2009 and were referred to as “Expansion Operations.” The operation in this particular study included all 19 distribution centers in 15 states. The
associate population in this project consisted of approximately 280 people. This population included distribution 1, distribution 2, operations support, leads, supervisors, and managers, all positions within the distribution centers at ORS Nasco, Inc..

Scope of the Project
The scope of the study was limited to the base safety program, known as the Safe Work Practices. Other compliance training programs, often related to safety such as hazard materials (Haz Mat), evacuation and disaster, blood borne pathogens (BBP), fire safety, and Environmental Protection Agency (EPA) compliance, were not directly addressed in this study. A primary reason for exclusion of these training programs was these elements generally have little to no affect on injury rates or initial cause of injury.

The findings of this project were used to determine the effectiveness of the Safe Work Practices in preventing recordable injuries and lowering the OSHA Rate. Effectiveness was determined by measuring the average of the OSHA Rate of the facilities in the three years post implementation compared to the year previous to implementation.

The safety program and this study were contained in the distribution centers as well as their associates and management. Associates for ORS Nasco, Inc. in the corporate offices, sales, and marketing were not included in the study. The distribution centers do have a limited number of administrative and support associates in an office environment that were also included in the study, as they are structurally and legally considered employees in these facilities.

Significance of the Project
This project provided significant benefits for ORS Nasco, Inc. as an effective safety program as it produced well-trained and more knowledgeable associates. This results in a workforce more capable of recognizing the safety hazard of the environment in which they work as well as equipping associates with skills to perform their job in a safe manner while avoiding injury to self and others. Reducing injuries also produces numerous financial benefits to the company including lower worker’s compensation insurance, reduced medical bills, and reduced instances of fines and litigation. Other positive impacts include improved employee morale, attendance, recruiting, and less turnover. These benefits contribute directly to the company’s goals by demonstrating the mission statement of “enabling partners to succeed.” The company values are indeed supported though protecting the organization’s most important partner, the associate.

Many safety programs focus on meetings, observations, and strictly defined rules. This project was unique in that the Safe Work Practices heavily focused on the associates and their individual responsibilities. This Safe Work Practices program also utilizes meetings, safety committees, and observations, but differs in regards to just having rules. The safety program is based on the employee’s knowledge of the risks associated with employees’ environment. Employees must use specific methods to identify and avoid hazards. This creates an environment of ownership of one’s own safety and the safety of their coworkers. The program ultimately produces a culture of accountability and places safety performance as an essential element of the job for both the hourly employee and management. The program engages all associates at once with a high level of consistency while addressing multiple facilities.

Definition of Terms
Pure Wholesale: Half of the key marketing slogan of “pure wholesale – pure value”, for ORS Nasco, Inc. This emanates as a promise to the customer base that ORS Nasco, Inc. will only sell their authorized distributors, thus never undermining the relationship by selling around them to end user or consumer (their customer).

Bolt-on company: An addition to the corporation usually occurring through purchase or merger to a company that generally expands services, products, or assets in the base company’s core business model.

Associates: The employees of ORS Nasco, Inc.

Customer: Customers of ORS Nasco, Inc. are distributors that purchase some or all, of their product from ORS Nasco, Inc. These distributors sell the product on the retail level. This is commonly referred to as selling to the end user or consumer of the product.

Suppliers: The companies that manufacture the product that ORS Nasco, Inc. purchases for resale.

Safety Program: At ORS Nasco, Inc. is an all inclusive behavioral based training and management program for administrating the safety of all associates.

Safety Manager: At ORS Nasco, Inc. is a management position responsible for all aspects of the safety program. This includes continual development, oversight, delivery, and execution of training, performance, record keeping, and reporting of all safety and compliance elements.

OSHA: Occupational Safety and Health Administration (OSHA) is a federal agency that develops the laws and rules that govern workplace safety and compliance in the United States. All companies and government agencies are subject to the authority of OSHA.

OSHA Rate: Also known as “rate of injury”, is a calculation of recorded hours worked and injury data to produce a ratio used to benchmark performance of small and large operations and or companies.

Workers Compensation: State run and mandated insurance fund to cover injuries that occur while on the job.

Distribution Center or Facility: At ORS Nasco, Inc. the distribution center is a building, which is stocked with products to be redistributed to retailers (distributors) or directly to consumers on behalf of the distributors. Distribution centers at ORS Nasco, Inc. range in size from 65,000 to 140,000 square feet and employ from 8 to 105 associates.

Hazard Materials: Manufactured product containing chemical or physical properties deemed, by the federal government, to have hazardous effects on health and/or environment. This term is specific to product. Corrosives, flammability, carbons, inhalants, and cancer causing agents are examples of hazard material.

Hazard: General term referring to a safety hazard, which includes anything that would endanger the wellbeing of an associate, customer, visitor, public, facility, property, equipment, or environment. At ORS Nasco, Inc.

Director of Operations: A management position at ORS Nasco, Inc. that is directly over all of the distribution centers and other functions considered operations within the company. Responsibilities are the strategic planning and execution of all operation functions including budgeting, quality control, safety, and associate development that aligns with company goals and policy.

Publicly Held Company: A Corporation whose stock is owned by members of the general public and traded on one of the open stock exchange markets.

Review of the Literature

Business remains an area plagued by continual risk of employee injury due to lack
of both safety competence and safety programs. “Occupational accidents and injuries continue to be a major source of concern for workers, safety researchers, and practitioners (Hermann, Ibarra, & Hopkins, 2010, p. 7). Organizations choosing to undermine the importance of workplace safety often experience decreased morale among employees, increased workers compensation suits, unfavorable employee performance, and declining revenues consequences. In response to workplace crises, behavioral psychologists, management professionals, and baseline employees have developed safety programs and methods that are proven effective in decreasing overall risk. The key to success in any safety program is cooperation between management and employees. Moreover, the necessary safety measures depend on the characteristics of the organization or particular industry in question, as well as guidelines and regulations set by OSHA.

“A safety program can be described as a dynamic set of intervention activities implemented at a worksite where the aim is to prevent incidents and accidents at the workplace” (Olsen, Bjørkan, & Nævestad, 2009, p. 391). Issues of frequent incident or injury are normally the core of every safety program, as they seek to diminish these risks over time (Welborn & Boraiko, 2009, p. 41). Similarly, at the core of every workplace should be an extensive concern for employee safety and confidence. Mandel & Hensen, (2011) stated, “Safety is a choice, lifestyle and a commitment. There is nothing more important…” (p. 59). As safety programs can often involve a massive undertaking, Raines, (2011) implies that while safety should not conflict with other organizational goals, it should adhere to the needs of the entire organization (p. 41). Thus, the difficulty of integrating appropriate safety measures and programs is apparent and frequently knocks at the doors of many organizations.

Why Organizations Need Safety Programs

According to Moayed, (2011) simple compliance with regulations formulated by OSHA can essentially deprive a company of its competitive edge (p. 28). Further, “The Bureau of Labor Statistics reported 5,214 fatal occupational injuries in the U.S. or 3.7 per 100,000 full-time equivalent workers” (p. 28). These numbers did not include the massive amounts of “non-fatal occupational injuries and illnesses that required days away from work for medical treatment and recovery…which ranged from five to 41. (p. 28). While these numbers are staggering, it does not stop there. Indirect costs such as lost production time for workers and managers, delays, costs of hiring new employees, legal fees, and perhaps a damaged company reputation are also threats lurking within workplace incidents (p. 28). Saxena, (2010) mentions that distribution centers should not simply seek a “check in the box” with regard to quality and quantity of training sessions expected by OSHA. “…Don’t be surprised if [a company’s] levels of OSHA-recordable incidents are no better than the industry average – or worse” (p. 26).

For any business, Moayed (2011) states, “that there are three principle values to occupational safety and health programs: people, public trust, and profit” (p. 28). It goes without saying that employees should be guaranteed a safe work environment to enhance productivity and allow an organization to retain employees with ease. The public also plays a large part in benefiting an organization through trading; if a company builds a favorable reputation even minutely based on safety compliance, expansion and future ventures will likely be met with very little opposition. Accordingly, organizations with successful safety
programs will enable innovative thinking to better serve stakeholders as well as customers to enhance overall market quality (p. 28).

However, it is not only the outputs of an organization that matter in the long term. Mendel and Hensen (2011) explain that when well-designed safety programs are put in gear, employees will experience increased morale and confidence that their employer is looking out for them (p. 58). Trust is incredibly paramount with regard to safety programs as employees are typically sensitive to management actions. Organizations with healthy cultures and safe climates foster more innovative employees that are aware that management is genuinely interested in their safety (Raines, 2011, p. 39). When an organization creates an environment where its employees feel safe, the respect of its employees will soon follow.

**Types of Safety Programs**

Companies use several types of safety programs to best meet the needs and goals of employees and managers alike. Organizations also use a handful of selected basic theories of workplace safety approaches as foundations to modify and adhere to the organization itself. Safety management techniques require more than a one size fits all approach. Below are several common methods explained and actual examples are found in the proceeding section.

The Failure Modes and Effects Analysis (FMEA) is renowned proactive technique that evaluates potential risks to employees before a particular work process is introduced (Welborn & Boraiko, 2009, p. 37). In essence, FMEA is an analytical technique used to identify, quantify, and prioritize risks while lending itself to “team involvement through various brainstorming exercises and evaluations” (p. 37, 41). Through the FMEA process, risks are traditionally placed into three categories: severity, occurrence, and detection. Each category is then rated on a scale of 1 to 5, with the lower rating indicating a lower risk (p. 37). Companies will then create and distribute methods by which to alleviate the risks found in the FMEA analysis.

A behavior-based approach to safety (BBS) also exists as an option with which employers can easily build upon and modify to meet specific organizational needs and goals. “The methodology used in behavior safety programs is based on observational and feedback processes that often require frontline staff to carry out behavioral safety observations on their colleagues” (Olsen et al., 2009, p. 392). Thus, the BBS approach is considered a “bottom-up” approach as employees have substantial latitude with regard to the success of the program (Olsen et al., 2009, p. 392). The flexibility of this approach allows numerous avenues of implementation. BBS requires management and employees to essentially look out for each other and report behavior and ominous risks accordingly.

Williams (2008, p. 41) praised BBS utilization as it helps increase employee involvement in safety measures through continual feedback between employees. Specifically, “by observing safety-related behaviors, employees point out risky behaviors that may lead to injury” (Williams, 2008, p. 42). Another source of BBS praise is its ease of implementation as follows: 1) Train managers and supervisors on principles and applications of BBS. 2) Form a team to manage the process. 3) Train lower-level employees on BBS. 4) Employees should begin to observe other employees. 5) Employees should be encouraged to fill out observation cards and managers should analyze results. 6) Meetings should be held to discuss results and to make adjustments in the program as
needed. Further, managers should emphasize that all reporting of behavior will be kept anonymous (p. 42).

Williams (2008) described a method in which management can follow up on a specific problem area by a 4-step process known by the “DO IT” acronym: D = Define, O = Observe, I = Intervene, T = Test (p. 43). Through this method, a team is formed and “works with hourly (and other) employees to develop interventions to improve the defined behaviors, then tests whether the interventions worked” (p. 42) The benefits of such a system include increasingly open communication, improvement of overall quality of the workplace, continual knowledge, and it serves as a constant reminder of workplace safety (p. 43).

Similar to the DO IT method in simplicity and flexibility is the W. Edwards Deming Plan-Do-Check-Act cycle. “The strategic elements correspond to the ‘planning’ phase; the ‘do’ stage has been extended to reflect both routine and complex activities; the ‘check’ section has been captured by progressive elements; and contingency responses such as emergency planning and rehabilitation are covered by the ‘act’ phase (Makin & Winder, 2009, p. 335). Although the Deming cycle is relatively elementary, the benefits line up with those of the DO IT method.

A very user-friendly, simplified safety program that assesses and explains at-risk and safe behaviors is the Activator-Behavior-Consequence (ABC) model (Williams, 2008, p. 41). For example, ‘activators’ include safety signs, meetings, and rules. ‘Behaviors’ are observable workplace actions, such as wearing a safety harness or protective eyewear. Consequences include both favorable and unfavorable; leaving work safely at the end of the day or experiencing injury, respectively (p. 41). Second in ease is holding a Kaizen workshop where ideas are generated to emphasize continual improvement in the workplace. These short-term workshops generally include personnel from all disciplines as well as affected employees who typically discuss existing protocol and ways to incorporate more safety practices (Raines, 2011, p. 42).

Safety Programs in Action

More often than not, actions are good in theory and are not carried out as well as managers at times hope. However, countless companies have experienced success with the aforementioned strategies with regard to safety in the workplace. Welborn & Boraiko (2009) examined the success of RadioShack Store Fixtures (RSSF) focus on safety, where, “at the beginning of each calendar year, [a] committee selects project objectives for the coming year…and uses FMEA to prioritize its project activities (p. 39, 40). In this particular study, RSSF identified risk, evaluated risk, and then examined the likelihood and severity of risk in relation to employees loading warehouse trailers. The committee then determined the root of the risk(s), accordingly developed an action plan, and ultimately experienced vast reduction in number of injuries (p. 40, 41).

An oil company incorporated the DO IT strategy as a solution to low levels of glove use among employees. According to Williams (2008), “three months of observations revealed that employees wore their gloves only 25% of the time (D = do use gloves, O = observe for 3 months to find percentage of use) (p. 42). Indeed, the company had the option of mandating glove use at all times as a solution. However, management decided to elect a ‘steering team’ to speak with employees to discover a less intrusive way to encourage glove use. Accordingly, “The team brainstormed and implemented the following interventions: (I) = provide better fitting gloves, make gloves
more accessible, provide hand injury testimonials, set a goal for 85% glove use in 6 months, and convince the safety director to shave his head if the goal is met” (p. 42). Strikingly, the first month yielded safe scores that climbed from 25% to nearly 100% and were maintained for 6 months. “The steering team continued to test glove use (T) for several months…although glove use dropped to around 75%, this level was considered an improvement compared to the baseline data of 25% (p. 43).

Lastly, Mendel and Hensen (2011) discussed a DO IT/campaign approach utilized by Republic Services, a company in the solid waste industry. Republic Services celebrated its seventh year of reduced accident frequency and leading safety performance through its ‘101 Days of Summer’ campaign in 2011 (p. 58). Prior to the campaign, the company exhibited growing numbers of injuries and accidents during the summer months and began introducing safety themes, banners, and ongoing employee training for increased safety awareness in response. The company saw a 61% reduction in the number of incidents in daily operations they decided to focus on (p. 59).

**Employee Involvement in Safety Programs**

A major component to any safety program is the employee. “Currently, few U.S. government regulations require employee involvement in safety programs. One exception is the OSHA Process Safety Management Regulation [29 CFR 1910.199©]. The employee participation of the regulation states, “Employers shall consult with employees on the conduct and development of process hazard analyses and on the development of other elements of process safety management,” and many companies have used this to incorporate employees in safety programs (Welborn and Boraiko, 2009, p. 38). More attention is given to OSHA in that it implies the best work protection will surface when all employees are involved in safety processes, further strengthening the organization overall (p. 38).

If companies engage their employees as much as possible, they can ultimately build a culture of safety within the organization that will transcend the guidelines posted from a regulation book. Williams (2008) states, “Optimizing safety culture requires active employee engagement for safety.” However, safety programs are not a one-way street between employee and manager. “Employees must provide each other corrective feedback when risky behavior is identified, especially since shortcuts are often perceived to be faster and easier, and because supervisors are not always present. This corrective feedback also sets the norm that safe behavior is expected” (p. 40).

Raines (2011) explains that organizations can retrieve a wealth of information from employees by “soliciting ideas and opinions when developing job hazard analyses, risk assessments and similar documents” (p. 38). Employees will often give way to excellent ideas and inspiration for innovative thinking. In turn, employees appreciate their incorporation to solutions because they want to feel their employer is concerned for well-being and safety. Not to mention, they appreciate when their voices are heard and are able contribute to an improved corporate culture (p. 39, 43).

Another way that companies can continually foster a culture of safety is through mentoring employees. “This is especially true when companies have large numbers of retiring employees who may (or may not) pass on their detailed, craft knowledge to new hires (Williams, 2008, p. 41). More experienced employees can often help incorporate older safety techniques with new hires and share lessons learned
with younger employees entering the workforce. This method of employee participation is being more widely utilized today as several generations are in the workforce at once.

Manager Involvement in Safety Programs

Just as the employee plays a large role in safety programs, the manager’s role is often just as important as it transcends simply creating a program for employees to follow. Managers should familiarize themselves with distinct behaviors in order to reach success. Williams (2008) implied that it is at the discretion of the manager to provide positive and insightful feedback as well as corrections to employees (p. 45).

Saxena (2010) ensured that if managers make safety their priority, employees will make it theirs as well (p. 26). Making safety a priority requires enthusiasm from managers and trust in employees to follow through with program requirements. Consequently, Raines (2011) also pointed out the importance of managers initiating contact that is not demeaning, but expresses concern for the employees’ safety instead (p. 40). However, besides correction and realignment with safety purposes and goals, there are multiple ways in which managers can exert influence on employees to follow a certain safety program. Managers can influence safety by selecting and training good employees from the beginning and encouraging peer feedback continuously (Williams, 2008, p. 41).

“Management (including safety personnel) who effectively involve and engage employees when reviewing potential workplace modifications can make a significant difference in the success of such projects” (Raines, 2011, p. 38). Not only will engagement excite employees, it will make the transition to new safety programs increasingly smooth and feasible to all. However, effective behaviors must be strategically chosen and utilized depending on the circumstances and needs of the organization. Thus, “…highly engaging methods of safety training are considerably more effective than the less engaging methods of training in knowledge acquisition and safety performance” (Burke et al., 2011, p. 62).

Conclusion

An exhaustive amount of time has been spent by psychologists and companies producing safety programs that not only comply with laws and regulations, but also enhancing the safety and work environment for employees. Key characteristics of each type of safety program foundation, examples of programs in action, and arguments by professionals produce the continual cooperation of both management and employee. The roles among management and employees involved in implementing programs are often somewhat interchangeable, thus relying on both parties for present and future success. By examining original theories of safety methods in the workplace, this project will incorporate similar principles of the mentioned research to provide evidence of the necessity of safety programs in nearly any company to achieve long-term success and viability.

Methods & Procedures

Hypothesis

The purpose of this study was to analyze the rate of injury before and after implementing a behavioral based safety program in the distribution facilities at ORS Nasco, Inc.. Many organizations simply overlook the comprehensive value of safety programs in the workplace, thus resulting in a lack of confidence by employees and subsequent lack of productivity in all regards. Continual full dedication by facility managers and employees is crucial to experience future success within a given
company. With some effort by management and employees, improvements will likely occur. Therefore, the intended outcome and objective of this particular study was to demonstrate whether or not by implementing Safe Work Practices, reports of injury would decrease at ORS Nasco, Inc.’s distribution facilities. The alternate hypothesis of this study states that the behavioral based work safety program, when implemented, significantly decreases the incident of injury in the workplace.

**Design**

The research design utilized was a quasi-experimental method to measure rates of injury at ORS Nasco, Inc.’s distribution facilities before and after implementation of Safe Work Practices. The dependent variable was the number of injuries reported at each facility, which is, technically, the standard industry OSHA Rate calculated using number of injuries and hours worked at a facility.

The independent variable was the implementation of the Safe Work Practices program throughout the company’s distribution facilities. Employees were not manipulated to comply with the Safe Work Practices program; it was mandatory requirement for their job to adhere to the program on a daily basis. Employees were not informed that the rate of injury was being monitored for the purposes of this study. Doing so prevented any variability or bias in the end result, as employees were not attempting to behave or work in a different manner to skew the results of this study.

**Participants**

The participants of this study included all of the associates in the distribution facilities of ORS Nasco, Inc, numbering 19 total. This study did not include corporate office locations or employees associated with corporate functions. Some facilities were operating prior to 2008, which was when the safety program was initially implemented; this included the Birmingham, Chicago, Harrisburg, Houston, Minneapolis, Muskogee, Orlando, and Visalia locations. The Muskogee distribution facility is unique as it was the first location to implement the safety program in 2008. The Columbus and Dallas facilities began operations in 2009. The Atlanta, Charlotte, Denver, Kansas City, and Portland facilities began operations in 2010 while the Boston, Grand Rapids, Los Angeles, and Pittsburg facilities began operations in 2011.

Seven of the eight facilities operating prior to 2008 did not have the Safe Work Practices program implemented until 2009, however, injury data from 2007 was collected for a before and after comparison. By 2009, each existing facility and subsequent new facilities were utilizing Safe Work Practices or had a future plan to comply. Each facility had no safety program implemented at one time and over a span of four years each existing and new facility implemented Safe Work Practices. No other characteristics of these facilities than injury rate and hours worked were taken into consideration for the purposes of this study.

Facility managers were responsible for ensuring the proper implementation of Safe Work Practices and reporting injuries promptly to the proper administrative associates of the company. Oversight of all facilities was performed by a single safety manager within the company under the guidance of the Director of Operations.

**Instrumentation**

The dependent variable of this study was measured by collecting the number of reported injuries at each distribution facility, then plugging that number into the industry standard OSHA rate calculation. This calculated rate is annually reported to OSHA and the Department of Labor to determine the overall safety of the company. The OSHA rate creates an equal trending number
based on a given company’s reportable injuries if they worked 200,000 hours. The OSHA rate itself is calculated by taking the number of recorded injuries and multiplying it by 200,000 and then dividing that by actual hours worked, or 
\[
\text{rate} = \frac{\text{# of injury} \times 200,000}{\text{hours worked}}
\]

This standard calculation ultimately provides a consistent level of performance across organizations or facilities of varying sizes. The 200,000 hours for the calculation are equivalent to the hypothetical hours worked by 100 employees, averaging 40 hours per week over a 50 week period and subtracts two weeks for holidays and vacation time. If the total hours worked is less or more than 200,000, it does not matter because the formula equalizes the difference to establish a universal benchmark for the industry. A sub-par OSHA rate obtained after performing the calculation would imply the company needs additional safety training or more rigorous compliance checks.

Additionally, acceptable OSHA Rates vary by industry and may even vary from year to year, depending on reported numbers from the previous year that will ultimately set the acceptable rate and scale. The internal benchmark and continual goal for ORS Nasco, Inc. operations is an OSHA rate less than 4.00. This is considerably superior performance compared to the anticipated 5.51 OSHA Rate industry average for warehousing as reported in 2011 by the Department of Labor’s Bureau of Labor Statistics (http://www.bls.gov/iif/). Thus, not only is ORS Nasco, Inc. meeting the standard criteria, it is exceeding the industry standard and expectations.

For the confirmatory analysis, there were two separate tests run from the resulting annual OSHA rates of each facility. The first test was a comparison to discover the overall reduction of OSHA rates for all of the distribution facilities combined that were included in the study before and after implementation of Safe Work Practices in 2007 and 2009, respectively.

The second test was performed to examine the Muskogee facility more closely as it was the largest and longest operating facility with the highest amount of work hours by employees. The Muskogee location was the first distribution facility of ORS Nasco Inc. to use the Safe Work Practices and comprised approximately 50% of the total operations group overall in 2008. By examining the Muskogee location more closely, the study could examine the impact of hours worked and the Safe Work Practices on the rate of injury. This will be discussed near the end of the paper.

Data Analysis

Descriptive statistical analysis. The mean and standard deviation were found for the dependent variable using injury data from the distribution facilities. The data were then entered into the STATISTICA program for analysis.

Limitations

A major limitation of this study was that there was no control group, therefore the study cannot determine if the OSHA injury rate would have worsened or improved without the program. The rapid expansion of facilities was a challenge as half of the facilities were not open and operating in the ‘before’ data collection. Another limitation was mere four years a data used for the study, which may not be enough to reveal that Safe Work Practices is feasible to use throughout the duration of the company’s existence. Additionally, the ‘before’ data were limited to the immediate year before the initial implementation of the program, creating increased potential for a higher OSHA rate in the after data. Thus, more years of examined data might have been useful. The study also did not examine the actual injuries reported in detail, such as
severity or work time lost; it only considered the fact that an injury was reported. A lack of detail could become a limitation for validity consideration.

**Summary of Results**

**Descriptive Data Analysis**

A total of 19 facilities were included in this quasi-experimental study, both new and existing. OSHA rates were analyzed for all ORS Nasco Inc. distribution facilities. In examining the facilities already operating by 2008 (before Safe Work Practices was implemented), the rate of injury among the 8 facilities had a mean of 6.57 with a standard deviation of 9.88. The rate of injury for the 19 facilities after the program was implemented had a mean of 2.43 with a standard deviation of 2.83. Table 1 indicates the findings.

Table 1

**Descriptive Statistical Information**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Descriptive Statistics [David Eidson Composite]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Valid N</td>
</tr>
<tr>
<td>2007 OSHA</td>
<td>8</td>
</tr>
<tr>
<td>OSHA After Average</td>
<td>19</td>
</tr>
</tbody>
</table>

A line plot of the multiple variables of injuries reported by the distribution facilities was created to illustrate each individual facility’s OSHA rate before and after implementation of Safe Work Practices. Figure 3 indicates the findings.

**Inferential Data Analysis**

The null hypothesis stated there would be no reduction in rate of injury among the facilities where the safety program was implemented \( (H_0: \mu_B \leq \mu_A) \). The alternate hypothesis stated there would be a reduction in rate of injury \( (H_a: \mu_B > \mu_A) \). A single sample \( t \)-test was performed with a .05 level of probability. The critical value was +1.895 and the \( t \) was .629. The null was not rejected, meaning there was no significant decrease in the rate of injury after the implementation of the Safe Work Practices program.

The conclusion of this initial study was that the Safe Work Practices did not significantly decrease the incident of injury among all distribution facilities of ORS Nasco, Inc based on the years examined, as exhibited in Figure 4. However, it should be noted that the confidence interval was much greater in the ‘before’ data and tighter around the mean for the ‘after’ data. One can only conclude that the improvements seen in the Muskogee facility contributed to the more controlled process. This will be discussed at length in the Exploratory Statistical Analysis section.

Figure 4: The 95% confidence intervals overlap so there is not a significant difference even though the mean decreased.

**Figure 3: Line plot**
Exploratory Statistical Analysis

The initial test suggested there was not a significant decrease of injury rates of all ORS Nasco, Inc. distribution facilities. However, as previously stated, the study additionally examined the Muskogee distribution facility more closely. The decision to run additional testing on Muskogee’s data was made after examining the results in the line graph of Figure 3, which undoubtedly showed dramatic before and after results. A single sample t-test was done with a probability of .05, with a critical value of -2.35 and t was -20.10. The null was, in fact, rejected (p=.000269). This confirms that the amount of injury likely did reduce significantly after the implementation of the Safe Work Practices program. The t test was exploratory, however, the Bonferroni correction level of significance divided by two test (.05/25 = .025). If .025 were used, the null would be rejected. Table 2 indicates the findings.

Table 2

Exploratory Statistical Information

<table>
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<tr>
<th>Variable</th>
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<th>Std. Dev.</th>
<th>N</th>
<th>Std. Err</th>
<th>Reference Constant Value</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Muskogee After</td>
<td>4.745060</td>
<td>2.113276</td>
<td>4</td>
<td>2.006396</td>
<td>29</td>
<td>0.100011</td>
<td>20-1096</td>
</tr>
</tbody>
</table>

To further explore the results, predictive analytic techniques called feature selection and root cause analysis were performed. Figure 5 illustrates the results below.

Figure 5: Feature selection and root cause analysis. This test was run to indicate which variable is most likely to predict injury. The two variables included were hours worked at all facilities and the safety program.

The results seemed to conclude that hours worked were the strongest indicator that an injury would occur (r =.88) and (p =.004), and the Bonferroni critical p value would be .05/3 = .0167. Additionally, because .004 < .0167, this study can likely imply the correlation is indeed significant.

General Discussion and Conclusions

Research previously discussed in this paper indicates the rate of injury will decrease slightly if a sound safety program such as Safe Work Practices is implemented. This is evident in both new and legacy (existing) facilities. The results of this study were not indicative of a dramatic decrease of injury occurrence before and after implementation when all facilities are included. However, the Muskogee facility did show a significant decrease after implementation, supporting the possibility of the safety program’s ability to reduce the injury rate. However, the significant positive results in a single facility are not enough to make any sweeping conclusions.

The OSHA rate for ORS Nasco, Inc. is relatively steady and reveals slight decreases each year when viewing all facilities combined. This, despite adding a significant amount of new employees and annual work hours, ultimately increases the probability of injury incidents as shown in the importance plot indicating hours worked as the predominant variable predicting injury.

Strengths and Weaknesses

The results of this study were based on all 19 facilities, 11 of which were not operating or included in the ‘before’ implementation of safety program data. The associates at these new facilities were participating in the safety program from the
These costs are lost work time, lost productivity, and decreased employee moral. These are important indicators of the future long-term success of ORS Nasco, Inc.

Suggestions for Future Research

If one wished to continue research, a consideration could be to study the long-term effects of a behavioral based safety program in maintaining a safe work environment and low injury rate. This could include surveying attitudes of employees about the safety program to determine if their personal view of the workplace has improved (perhaps if they feel safer), which would be a good indicator of success of the safety program.

Another area of research could include a cost study of savings to the company. There are many financial factors including the actual medical cost of treating injuries, the reduction in workers compensation premiums, litigation, lost productivity, and fines. This could aid in determining potential future investments to enhance the safety program and associate training. Any given company would most likely discover they would benefit from a program such as Safe Work Practices.

Findings of the root cause analysis, reflected in the importance plot, indicate a strong correlation of hours worked and injuries. Thus, a study to determine the impact of overtime on injury rate could also be considered as an additional area of exploratory study. Several elements such as optimum hours, fatigue, temperature, shift, and time of day could be included in varying combinations or separately to determine the effectiveness of the program over time. These items can be manipulated for the purposes of a future study.

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