Self-Directed Work Teams: Do They Impact Employee Motivation and Accountability to Reduce

Melissa Noyes

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Self-Directed Work Teams: Do They Impact Employee Motivation and Accountability to Reduce Unsafe Behaviors

Melissa Noyes

Department of Civil Engineering Technology
Environmental Management & Safety
Rochester Institute of Technology
Rochester, NY
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Approved by:

Maureen Valentine, P.E., Department Chair

Jennifer Schneider, CIH, Associate Professor, Thesis Advisor
Permission granted

Title of thesis ____ Self-Directed Work Teams: Do They Impact Employee Motivation and Accountability to Reduce Unsafe Behaviors

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ABSTRACT
This thesis attempted to tie Self-Directed work teams (SDWT) to safety performance through research, employee surveys and statistical analysis. The ultimate focus of the thesis was to answer two related research questions. To answer the questions required a trip down a road that is not, at this time, traveled frequently by safety professionals or other management. It is not to say that managers throughout the world are unaware of SDWT, but because SDWT are not used in many companies, it was difficult to obtain information to fully attack the problem. However, the focus remained on answering the problem, and defining the contributions this thesis could have on companies looking for new ways to improve their safety programs. This thesis attempted to determine the impact SDWT have on employee motivation and employee behaviors. To obtain this question, sixty-two surveys were obtained from four companies; three that did not use SDWT, and one that does. The surveys were created by the thesis author, and relied on the two research questions, employee culture survey examples, and general safety performance measurements such as total recordable injuries and use of management systems such as ISO 14001 and OHSAS 18000. The conclusions from the surveys led to three major contributions, which attempt to impact how companies utilize teams and how to improve their safety programs with the long-term solution of SDWT.

Key Words: Self directed work teams, Teams, Safety Performance, Behaviors, Motivation, Involvement, Accountability, Safe.
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1.0 Introduction

Disabling occupational injuries affected 3.4 billion people in 2003 (NSC Injury Facts 2004 edition). It is estimated that of the 3.4 billion injuries, 51 trillion unsafe behaviors occurred before an actual injury resulted (based on Heinrich, Bird and Germain statistical process, discussed by Geller). These statistics have plagued many employers and environmental, health and safety (EHS) people for years. Unsafe behaviors are not necessarily purposeful acts by a person. If a person knows an injury is likely to occur as a result of an unsafe behavior, it would be logical that they should be motivated to behave safely without external pressure to do so.

“...American workers clearly indicated that as far as they’re concerned, the work ethic is alive and well. ...want to work hard, want to contribute to a satisfying group effort, and do get a sense of accomplishment from doing the best job they can, [but] ...only to the minimum level necessary to keep their jobs. (Orsburn et al, p4)” This lack of desire to work above the status quo has not just affected the productivity of companies - the safety performance is affected, too. If people work the “minimum level”, it brings them to the first few levels of the injury pyramid – property damage, near misses, and minor injuries (Geller). It is just a matter of time, statistically, until that same person will be counted as one of the billions who suffer serious injuries each year (NSC Injury Facts 2004 edition).

Going beyond the minimum requires accountability, motivation, and positive attitudes is a behavioral overhaul. To get this change in employees who are currently stuck at the minimum output level, the EHS profession has determined that empowering and involving employees is “more critical than OSHA compliance, ergonomics, management systems, and behavior based safety” (ISHN white paper). The next logical step then is - how to get empowerment and involvement to produce safe behaviors and ultimately reduce injuries.
This thesis sought to examine the next step - to determine if self-directed work teams enable organizations to achieve the actions for and meet the needs to minimize or eliminate unsafe behaviors that lead to injuries.

The concept of “teams” is not new to many organizations. Teams have been used for many years, in efforts to involve and empower employees. Self-directed work teams (SDWT) have also been around for years, yet few companies use them because they do not come naturally and companies do not want to wait the two or three years for the positive affects of SDWT to take hold (Moravec).

A crucial disclaimer of this thesis is that, “Self-directed teams are a means to an end, not an end in themselves.” Self-directed teams must be used to help meet the goals of an organization (Orsburn, et al page x.), not to be relied on as the magic fix when injuries rise or when production problems occur, therefore, safety must be integrated into the organization’s strategy just as quality, production and other organizational goals already are. How safety is integrated with business could be an entire topic in itself, therefore, this thesis focuses on the relationship of teams, behaviors, culture and safety’s role in this relationship.

The inherent structure of self-directed teams allows the team members to be fully involved and empowered. The team members want to support the team, and ensure it is successful, which leads to more satisfied customers, more committed people, innovative and flexible responses to changes, and better results (Orsburn et al, p.vii). How do SDWT succeed in creating a process for such great results? The characteristics of SDWT provide the avenue for success: they have more resources than traditional teams, a wider range of cross-functional skills, greater decision-making authority, the ability to solve problems, schedule and assign work, handle personnel issues like absenteeism and team member evaluations, and receive extensive
training in administrative, interpersonal, and technical skills required to maintain the self-managing group (Orsburn et al, p9).

1.1 Research Focus

Based on the information stated above, this thesis focused on two related research questions. This thesis was written to build a foundation of knowledge through the background information and the literature review, which are the first sections. The information in the first chapters traced the relationship between teams, behaviors, motivation and organizational culture, and established the starting point for the case studies, which are in the last chapters.

The case studies involved an analysis of four (4) manufacturing organizations, one organization with existing SDWT at the time of the study, and three which did not. These case studies were chosen based on accessibility to local contacts of the organization, heresy of the organization’s safety performance, and the goods produced by the organization. These case studies provided results of SDWT, or the lack thereof, had on the organizations in the study.

1.1.2 Research Questions

These questions will guide the case study information as it is gathered, and will be part of the final discussion and results of this thesis.

Primary Research Question: What is the value of tying safety to self-directed work teams?

Secondary Research Question: How can accountability improve through self-directed work teams to ultimately improve behaviors?
1.2 Definitions

- **Attitude:** a feeling or emotion toward a fact or state (Merriam Webster dictionary online)

- **Behavior Based Safety:** Psychologists have developed a systematic approach called behavior analysis to increase safe behaviors, reduce risky behaviors and prevent accidental injury at work and on the road. Organizations have adopted this approach, terming it behavior-based safety (BBS). BBS, which grew from early research by B.F. Skinner (1938, 1953, 1974), includes a variety of processes, programs, strategies, and tactics that apply behavioral psychological principles to change specific behaviors (Gilmore, Perdue, & Wu, 2001). (American Psychological Association)

- **Culture:** the set of shared attitudes, values, goals, and practices that characterizes a company or corporation (Merriam Webster dictionary online)

- **Empowerment:** Delegating authority or responsibility, or sharing decision making (Conger & Kanungo as quoted by Geller)

- **Involvement:** Degree to which employees in a given organization or department stay informed and make decisions about their work. (Orsburn et al, p.221)

- **Self-Directed Work Team (general definition):** a highly trained group of employees, from 6 to 18 in number on average, fully responsible for turning out a well-defined segment of finished work. (Orsburn et al, p8)

- **Self-Directed Work Team (as a process):** As a process, self-directed work teams become increasingly able to perform functions that in the past were done by others outside the group. All teams, whether they have an authoritarian manager, a
participative manager, a coach or none of the above that move towards greater empowerment you can consider a self-directed work team (Chaudron).

- Self-Directed Work Team (as an outcome): As an outcome, it is a team that without a management-appointed supervisor that substantially controls the creation (manufacturing or service), scheduling, design, quality control, procurement, and employee hiring/firing/performance feedback of a process that has a specific product or service. The company supports the team by its organizational structure, information system, compensation policy and management (Chaudron).

- Team: a small, interdependent collection of people with a common identity, unified commitment, loyalty and dedication to the group, who interact with one another, usually face to face over time, in order to reach a goal (Adler and Elmhorst p.226, 228)

1.3 Notes

1.3.1 During the discussion on the Evolution of SDWT, it will become clear that team building is closely linked with team development. Teams are made of humans, and the humans must be developed to build an effective, cohesive and empowered team. There are many methods for which to develop team members, however, they are not discussed because they are outside of the focus of this thesis. If more information is needed, please refer to Works Cited page titled “Team Building and Development Resources”.

1.3.2 Throughout this paper, the words team, self-directed teams, self-directed work teams are used interchangeably, unless the context requires clarification.

1.3.3 Only one company was used to represent SDWT. This is an important distinction because the use of only one SDWT could be like industrial hygiene testing with one
person out of fifteen on a production line. That one person may not do a task the same as
the others, and may affect the results of the monitoring. Likewise, the use of one
company with SDWT may have driven the results. This one company may structure the
SDWT differently than others, which may impact the employee's answers to questions
about motivation, involvement, and ownership.

- The company used to represent SDWT in this thesis used the following team
  structure: all employees, salary and hourly, are in teams. These teams are typically
  structured as follows (ranked in order of highest responsibility to lowest): assistant
  manager, group leader, team leader, team members. In areas such as Safety,
  Engineering, etc., a specialist would be added to the group, probably due to the
  inherent nature of knowledge and specialized skills required for the tasks in the team.

1.3.4 This thesis based SDWT on the traditional sense of the definition: teams which are self-
sufficient, focused, and have little to no management intervention in day-to-day
operations of the team. It was discovered during the thesis defense that SDWT may be
used only for specific tasks, such as Behavior Based Safety programs, or Lean
Manufacturing programs. However, the SDWT are successful when the BBS or Lean
programs are initiated 'correctly,' meaning the employees are trained extensively, create
a vision, decide on a structure, and have sufficient time and resources for which to
conduct the program. The literature reviewed did not identify many companies able to
reach this level of self-sufficiency, even for specific programs. Therefore, the traditional
definition of SDWT is sustained for this thesis, even though it is noted that SDWT could
be used for specific tasks, and not for an entire operation.
2.0 **Background**

When the Occupational Safety and Health Administration (OSHA) created the OSH Act in 1971, people probably believed it was another government paper trail. At that time, safety was at the forefront of everyone’s minds due to the amount of serious injuries and deaths occurring. [Although specific injury information is not available for the 1970’s, it is estimated that there are 45% fewer injuries in the United States.] (www.osha.gov – Henshaw 7/2002). Despite the decrease in injuries throughout the years, one thing has stayed true: no one wants to see people be injured. Unfortunately, these same people’s behaviors and involvement in safety programs do not reflect the truth. Employee ownership is still a future goal of most safety programs (ISHN White Paper).

Teams are frequently used by safety programs to address employee ownership, involvement, and accountability, but they are also the most prone to fail. Teams are forced to operate in the culture to which they are born. If that culture has poor leadership, poor communications, or failure to be open to share information, the team will fail (Johnson). Regardless of these facts, safety professionals and managers continue to reach for the same goals (increase, improve), but work independently of each other. Safety professionals create steering teams and employee safety teams which focus solely on improving safety; Managers create steering teams and productivity teams focusing solely on improvement on the end product.

Unfortunately, the 80/20 rule (20% of the population does 80% of the work) reflects human nature in most organizations; therefore, the Safety and Management teams are made up of the same motivated employees which make up the 20%. Resources become over used and the 80% who have been sitting idly by lose interest and desire to become involved. It shouldn’t be a surprise that this approach is not successful.
Integrating safety and organizational teams creates multi-functional work teams, which can be developed into self-directed work teams. This saves resources, which are lean in today's manufacturing companies, and provides a platform to address the overall strategy of [most] the organization: make products safely. Self-directed work teams also garner involvement, accountability, and even enthusiasm, all items which affect attitude and behavior (Moravec). By establishing a team with the intent to create positive attitudes and behaviors, the organization takes away the risky behavior that leads to accidents and the “it’s not my job” attitudes that lower productivity. This is what many people call the “win-win” situation, and is a result for which this thesis hopes to determine.

Self-directed work teams bridge the gap to ensure the necessary requirements to a safety culture change. They require the entire organization to work together, and to commit to the success of the teams. Safety program success hinges on employee involvement and management commitment. SDWT allow for employees at all levels to communicate and support the success of the safety program, plus they can be used for production, service, and all other aspects of a product life cycle. Therefore, SDWT should be able to support a positive safety performance change through the commitment, communication, motivation, and overall team-environment.

3.0 Literature Review
3.1 Origin of teams

“Working with others is a vital part of virtually every job” (Adler and Elmhorst p.225). This statement tells us that teams are not anything new. “Groups became a new focus of attention in the 1940’s after the Hawthorne studies were published (Roethlisberger & Dickson, 1939)... In recent years the use of work teams in
organizations has been increasing substantially, and this trend is expected to continue (Katzenbach, 1998).” Eighty percent of organizations with over 100 employees report 50% of their employees are in at least one team (Beyerlein & Harris, 1998)” (Yancey). The Hawthorne studies can be used as the unofficial start of teams. [This thesis does not discuss sports teams, which are the more official “beginning” of teams.] Elton Mayo determined that:

- Informal organization affects productivity. The researchers discovered a group life among the workers. The studies also showed that the relations that supervisors develop with workers tend to influence the manner in which the workers carry out directives.
- Work-group norms affect productivity.
- The workplace is a social system. The researchers came to view the workplace as a social system made up of interdependent parts. The worker is a person whose attitudes and effectiveness are conditioned by social demands from both inside and outside the work plant. Informal group within the work plant exercise strong social controls over the work habits and attitudes of the individual worker.
- The need for recognition, security and sense of belonging is more important in determining workers’ morale and productivity than the physical conditions under which he works. (Envision)

Therefore, work teams evolved due to the individual’s innate tendencies to act a certain way to please a team, which ultimately pleases the individual.

Self-directed work teams have a more recent history. It took years of struggling to improve productivity with unmotivated, unproductive employees for companies to realize something needed to change. In concert with the 1960’s, “many American workers started demanding a bigger say over how they were managed” (Orsburn et al p13). This was an age of empowerment for many people, and carried over to the workplace. Empowerment plays a major part in teams, and is usually synonymous with successful safety programs. When employees are empowered, they make the choices that
affect them, the company and their co-workers. Empowerment is direct feedback, without having to go through the Supervisor or other level of management.

This empowerment is major component required for behavior based safety programs, in which the employees, typically hourly employees, observe each other and document the findings. Employees must be empowered, and feel comfortable with their working environment in order to successfully contribute to behavior based safety. Team impact on behavior based safety programs is discussed later in this section.

3.2 **Brief Discussion of Team Evolution**

To understand teams, one must have knowledge of where teams began, and how teams evolve. We have already established where teams came from and why they were established. The discussion will now lead into the evolution of teams. The purpose of this discussion is to identify the different types of teams, and explain how self-directed work teams are grown. Self-directed work teams are not easily attained, but the figures and information provided below will explain how a company can begin the SDWT process. Safety’s role in the type of teams available at a worksite becomes more evident as the discussion turns to involvement and SDWT attributes.

Self-directed work teams are built on a foundation of involvement that is grown over time. This evolution of involvement into SDWT can be drawn along a continuum (Figures 1 and 2):
At the beginning of the continuum, the employees who desire to be in a team and want to see teams succeed become involved through suggestion programs, barrier removal teams, focus groups and other short-term problem-solving groups (Donovan; Chillis). As time progresses, involvement deepens and develops into quality circles and task forces (Donovan). Quality circles and task forces are also short-term groups, given a specific
task or duty. Quality circles are slightly less developed than task forces, since they are a group of employees with similar duties that meet with management periodically for the goal of improving a process through suggestions (www.answers.com). Focus groups initiate more involvement by allowing team members to provide opinions (www.answers.com).

Cross-functional teams are the next stop in team evolution. Employees in cross-functional teams are required to learn and be able to perform the others functions (Chillis). This requires a slightly longer-term, to allow for implementation of the team’s recommendations and findings (Chillis). The team members are all involved in the training process. However, cross-functional teams are not meant to be long-term due to the skills of the team members. The skills will drive the inherent behaviors of the team members, and will eventually cause loss of focus. For example, if a mechanic learns how to do an inspector job on a production line, but inherently will always want to jump in and fix the machine instead of inspecting the parts coming out, that part of the process breaks (Chillis).

Self-directed work teams are the last step in the continuum. They are the last brick in the team foundation which provides a long-term solution (Chillis). At this step, involvement is high and the team is self-sufficient including hiring and performance appraisals. The attributes of SDWT can be viewed as:

- Completes an entire piece of work
- Receives team-level feedback and rewards
- Assigns tasks to members
- Responsible for correcting problems
- Controls work inputs, flow, and output (McShane and von Glinow, p309)
Each of the attributes of a SDWT can be applied to a safety program, which makes the use of SDWT so appealing. Examples of how the SDWT attributes can aid a safety program: Assigns tasks to members – tasks such as giving safety talks, job safety observations for behavior based safety, completing safety audits would be completed by a SDWT. Responsible for correcting problems – this would assist a safety program in quicker resolution of unsafe conditions, and prevent injuries caused by the unsafe conditions.

3.3 The Role of Motivation in Teams

Managers, whether safety, human resources, or engineering, desire to create and sustain a culture that promotes effectiveness and efficiency. If a manager chooses the team-based approach, they will not have low expectations. However, a culture is created and sustained by the individuals within the organization. In order for the culture to be successful in the any new approach, the individuals must be motivated and must change their behaviors to reflect that of the new approach. How motivation affects new approaches such as SDWT, and motivation’s role in safety improvement through behavior based safety are discussed through the next few sections.

“The topic of motivating employees is extremely important to managers and supervisors” and safety programs (McNamara). Motivated employees will tend to be productive, involved, and exhibit safe behaviors. “People want to work safely all the time when they believe their jobs are important and that safety is a value integral to competent performance” (Geller 2003). Therefore, creating an environment to motivate could lead to safe behaviors and decreased injuries.
Motivation is a key topic in this effort because it is a function of the involvement and accountability of teams and of behavior based safety programs (to be discussed later in this section). In turn, teams and behavior based safety programs provide the structure to meet the needs and desires that motivate people. It is a circle of dependence – motivation, behavior and teams – which we will continue to discuss in this thesis. Herzberg’s Motivational Theory is an “attempt to explain the factors that motivate individuals through identifying and satisfying their individual needs, desire and the aims pursued to satisfy these desires.” His Theory is known as the Two Factor Theory, and is “based on the notion that motivation can be split into hygiene factors and motivation factors” (Envision).

Hygiene factors can de-motivate someone if they are not present. They include supervision, interpersonal relations, physical working conditions, and salary (Envision). A solid safety program can provide the motivation through physical working conditions and supervision.

Motivation factors will motivate when present. They include achievement, advancement, recognition, and responsibility. A behaviorally based team structure can provide for these factors. Motivation factors will positively encourage employees. Without motivation factors, employees will focus on the hygiene factors, to which they do not have direct control, thus the theory proves itself – lose motivation over something which the person has no control over (Envision).

3.4 Relationship of Behavior Based Safety and Motivation
Behaviors and motivation are intimately related: “Most humans will not change their beliefs, habits, or behaviors unless they are motivated to do so” (Grazier). The motivation must prove that a change in behavior will be for the better or there is some other “compelling reason” (Grazier). The desire to change these behaviors, beliefs, etc. is the goal of behavior based safety (BBS).

Behaviors can be discussed in terms of habits and types of behaviors that drive attitudes. Habits are required to avoid complacency. “Working safely is not easy, nor is it automatic. We have to work at it with the highest level of awareness” (McAuley). When we are not aware, we are complacent. Complacency is the “self-satisfaction accompanied by unawareness of actual danger or deficiencies” (McAuley). Habits are the end-result of behavior based safety programs. A habit is something you do over and over until they override your former behavior (unsafe or safe) and become automatic (McAuley).

To promote safe habits, behavior based safety programs rely on behavioral observation and feedback (Gilmore, Perdue, Wu). Complacency tends to override safe behaviors because “people are not perfect and will make mistakes despite their best intentions and working in the best of surroundings…” (Gilmore, Perdue, Wu) Complacency also lies with the individual. Therefore, behavior based safety can create a change in how the individual does their job and “require that individuals work together, going ‘beyond the call of duty’ for one another” (Gilmore, Perdue, Wu).

The types of behaviors that exist are many, but can be boiled down to deliberate and non-deliberate. Deliberate behaviors are taking risks, short cuts and nonconformance
to save time, increase comfort and convenience, and to look good. Non-deliberate behaviors are daydreaming, distractions, inattention, and stress (Theune).

Behavior based safety starts by identifying the “critical behaviors to change” (Geller). Any of the deliberate or non-deliberate behaviors could be chosen. Then, observers study and record the behaviors to measure frequency, duration, and rate (Geller). These observations are considered interventions to the ABC’s of Behavior. “Behavior is influenced by two distinct factors: activators and consequences. Activators precede behavior, Consequences follow behavior. The premise behind the ABC’s of behavior is: an activator tells a person what they should be doing; the consequence encourages/discourages or motivates the unsafe behavior. Therefore, in order to promote safe behaviors, a person must be motivated and encouraged to act safely (Gilmore, Perdue, Wu).

3.5 Organizational control (Culture) over behaviors

The previous information on motivation and behavior leads to a discussion of culture, referred to as organizational culture in this thesis. If an organization wants to change a culture, they must change behaviors and motivation.

Organizational culture is the “basic pattern of shared assumptions, values, and beliefs governing the way employees … think about and act on problems and opportunities” (McShane and von Glinow, p498). With this definition, we see the relationship of an individual’s behavior (“and act on problems and opportunities”) on an organization. However, an organization is made up of many individuals, who carry their own personal beliefs, values and assumptions. Management is among the individuals that
drive the decisions and control the culture of the organization. It is with them that changing or improving a culture rests. Therefore, giving management information on how culture can change with direct involvement of the employees, not just relying on management, is the focus here.

This discussion focuses around changing a culture to show the impact on attitudes, behavior and the corresponding accidents in an organization. Culture change is touted as one of the methods for which to improve safety performance. Figure 3 illustrates the type of culture and its corresponding accident rate, percent safe attitudes and extent of openness or sharing of safe attitudes within an organization. The figure shows that a more interdependent culture will result in lower accidents, higher percentage of safe attitudes and higher (more) sharing of safe attitudes.

![Stages of safety culture improvement](image)

**Figure 3,** Fleming and Lardner

Culture affects behaviors, and also affects the “macro level” of an organization as well as the “boundaries of receptivity and fit.” The “macro level” is the productivity, customer service, product and service quality, and operational efficiency of an
organization. The “receptivity and fit” determine how well a team initiative will work, because “certain types of teams require certain cultural characteristics to be successful” (Recardo and Jolly p5).

Further support of culture change and its affect on behaviors is by Peter B. Grazier’s statement, “When a change is personal, we only have to give ourselves permission to change. But when a change is in an organizational context, permission must be granted by those in power… if I work in an environment that doesn’t enable me to change, very little will happen” (Grazier “Resistance to Employee Involvement”). In other words, if the boss doesn’t want to change, I couldn’t change if I wanted to.

In brief, culture change has a strong affect on an organization’s performance through the control of behaviors, attitudes, and cultural health to take on a team based work environment. If a safety program is attempting to integrate behavior based safety into SDWT goals, but the culture will not accept this motive, the SDWT will focus purely on organizational efforts, leaving safety to fend for itself without involvement. As we determined through our previous literature, involvement is a key factor to establish accountability, motivation and therefore change behaviors. This is another key point of the thesis. So, to get there from here, SDWT issues and trends are discussed in the next section, showing how SDWT can be applied in many ways.

3.6 Current Issues and Trends

Teams can impact an organization in many positive ways, including how the organization reacts to external and internal pressures, the successful implementation of new improvement programs, and how to best utilize the workforce in ever-changing work
environments. Many of these improvement programs, including Lean Manufacturing, Six Sigma and Process Quality Initiatives have an entire segment on Safety. Safety is a quiet partner in these programs, but when the programs are successful, safety typically is too.

In the next section, several current issues and trends in organizational behavior and culture are discussed. The impact that teams have on these issues and trends, and safety’s role in the entire scheme will be identified.

3.6.1 **SDWT setting the stage for Lean Manufacturing**

"Many of the manufacturing philosophies that can improve operations and processes, such as Lean Manufacturing ... simply cannot gain traction without employees “owning” their jobs; for example, an employee’s ability to improve his or her work continuously is at the heart of Lean and its successes" (Wellins, Brandt, Taninecz, p6).

"Engagement is becoming the foundation of manufacturing excellence. Lean Manufacturing, or new technologies all can succeed or fail based on the commitment and passion of [your] workforce. [This] requires empowerment...employee development…” (Wellins, Brandt, Taninecz, p13)

"Unlike many manufacturing fads, lean manufacturing appears to be here to stay," says author Nelson J. Teed, a management consultant and mechanical engineer (Teed). Lean manufacturing has led many companies to excellence. However, “lean manufacturing is a better manufacturing system, not a cure all. The lean conversion must be part of a more comprehensive strategic plan” (Teed). It is because lean is just a tool that involves the use of self-directed work teams.
“Lean manufacturing is “manufacturing without waste,” with waste in the form of material, time, idle equipment, and inventory.” Companies use lean manufacturing to reduce waste, improve material handling, inventory levels, quality, scheduling and personnel. These improvements can only be obtained through the carefully planned interaction of humans and equipment (http://www.strategosinc.com/). For a successful lean environment, companies must involve every layer – managers are not just hired to supervise workers and make sure the workers do their job. Managers must assume the role of coach and facilitator, while work teams are given the day-to-day responsibilities of the production line or work cell (Hill and Jones, p452).

As more and more companies realize the need for lean manufacturing, work teams will be required to share the burden and effectively implement the lean process. A work team-based manufacturing organization establishes the discipline needed for lean: workers and equipment are arranged to process products without delay or wait, and without requiring additional handling between operations (Haigler). Therefore, teams become a double incentive for organizations wanting to proceed with lean manufacturing. Figure 4 illustrates where Lean manufacturing strategies rank with manufacturers in the United States, Australia, Mexico, and Canada.
Executives indicate initiatives in enabling world-class status. (Lynch; Figure 3, p29)

Safety plays a silent but strategic role in lean manufacturing. Safety is considered the 6th “s” (there are officially 5 S’s in lean manufacturing). The lost time and productivity following workplace injury are indicative of the waste that Lean strategies aim to avoid (Newman and Braun). Therefore, when lean manufacturing is implemented correctly, it should have a positive affect on both safety and productivity. Examples of how lean manufacturing and safety coincide - task to make lean: eliminate excessive reaching and repetitive tasks. Safety benefits = no lost time or cumulative trauma disorder such as carpal tunnel or tendonitis. Production benefits = less time to make a widget and more effective.

3.6.2 **Retaining Diverse Employees with a Team-Environment**

“As we enter the 21st century, workforce diversity has become an essential business concern. In the so-called information age, the greatest assets of most companies are now on two feet (or a set of wheels). Undeniably, there is a talent war raging. No
company can afford to unnecessarily restrict its ability to attract and retain the very best employees available” (McInnes).

A diverse workforce is a “capacity-building strategy” (McInnes). Capacity is required to “effectively solve problems, rapidly adapt to new situations, readily identify new opportunities and quickly capitalize on them. Capacity can be measured by the range of talent, experience, knowledge, insight and imagination available in workforces.” Employees who have diverse traits “will change the way you do business” (McInnes).

Once diverse employees are recruited and integrated to the organization, the true task it maintaining these employees. Diverse employees expect to be in a work environment where they can use their diverse talents along with upholding their personal values. They expect to be involved in business strategy and to be part of an effective organization. These expectations are the same for the organization – they expect diverse employees to use their special talents to further or to create a path for the organization’s success. Teams can provide the level ground to meet, and even exceed, both party’s expectations.

Self-directed work teams have many advantages, including (Williams):

- Better response to worker’s values.
- Increased commitment to the organization.
- Ability to attract and retain the best people.

SDWT provide these advantages through involvement, accountability, confidence, impact on the organization, and team rewards. Employees in SDWT are cross-trained, further developing their diverse traits and skills (Moravec). Employees in SDWT are exposed to all aspects of an organization, including environmental, health and safety.
requirements. Thus, teams provide the environment that meets and exceeds employee needs and values, which motivates them to stay with the company and remain involved.

Diversity has a relationship to teams through the information stated above, and how teams create the environment for diverse employees to grow. Teams benefit from diversity through the empowerment that diverse employees bring. "When employee diversity in the workplace is valued and a planned approach to managing diversity is taken, significant organisational benefits flow: (Managing Workplace Diversity)

<table>
<thead>
<tr>
<th>more effective personal/interpersonal communications</th>
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<tr>
<td>improved team functioning and performance</td>
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<td>increased creativity and innovation</td>
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<tr>
<td>greater capacity for problem solving</td>
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<td>enhanced equality of opportunity</td>
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<td>improved staff health and well being</td>
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<tr>
<td>reduced absenteeism and higher staff morale</td>
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<tr>
<td>recruitment and selection from a wider talent pool</td>
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<tr>
<td>increased ability to attract and retain valued employees</td>
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<tr>
<td>improved service and client satisfaction</td>
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<td>positive community image</td>
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The organizational benefits diversity brings to teams bridges the relationship to safety. As seen in the results of the ISHN 2005 White Paper, over the past 10 years, EHS professionals still believe that employee ownership (a.k.a buy-in) and empowerment are keys to improved safety programs. When employees buy in to safety, the power struggle weakens and evens out. Managers relinquish control because the employees show
interest in the team. The employees feel empowered and trusted, therefore will continue to help the team meet its goals (Seaman).

3.6.3 **Teams Help Navigate Downsizing/Mergers**

The increasingly global economy creates new challenges, and downsizing or "streamlining" or "re-engineering" are some of the actions organizations are forced to make. With the organization becoming flatter, there are new and/or increased roles which must be assumed by the existing employees. In order to not completely overwhelm these employees, the organization must use empowerment (Knox Jr.).

"Most failed re-engineering efforts center around a management group that would not accept the transition from a traditional management setting into an empowered culture" (Knox Jr.). To be empowered, the employees must be given the education and tools to make decisions and be as innovative as necessary. But, empowerment does not require the management to be completely "hands-off"; the work teams still need direction and information from the management to make the best of the situation (Knox Jr.).

Further, SDWT can provide a better opportunity to avoid mergers and increase joint ventures. Organizations typically share employees during downsizing and restructuring, so when individuals are replaced, the team-based setup can be installed, which will carry over. The work environment will not remain the same; therefore, change must come from the traditional structure commanded by individuals to team-based in order to handle different tasks during restructuring (Chillis). Figure 5 illustrates how manufacturing companies are becoming more function oriented, which is best met through team-based manufacturing.
Again, Safety plays a role in downsizing or “streamlining” or “re-engineering.” A major change in an organization will tend to cause increased stress and uncertainty, which is reflected in behaviors. Many times, a company can work millions of hours without a lost time injury, but the whisper of organizational structure change, especially if job layoffs are included, will add the factor of unsafe behaviors, leading to that record-breaking injury. “Layoffs implicitly send workers the message that safety is taking a backseat to production” (Lutgen). The steps listed below are suggested in efforts to control injuries during reorganization:

- “Spend more time on training and—most importantly—safety awareness and motivational activities when the level of job insecurity is rising.
- Get senior management to consider the impact layoffs might have on worker safety before layoffs begin. They need to recognize that when jobs are threatened, employees often feel pressure to cut safety corners to keep their production numbers up to try to keep their jobs.”
- Maintain or expand existing reward programs for safe behaviors. Job insecurity decreases safety motivation, but not as much if you actively reward employees for safe behavior.
- Increase the number of safety messages employees receive. (For example, use a “safety first” reminder from senior management as a paycheck insert.)
• Provide safety training to accompany job changes. Layoffs make it likely that remaining employees will inherit additional job duties. Make sure these workers receive the instruction they need to safely perform their new duties.
• Assess the level of safety monitoring. Make time for monitoring safety compliance, maintaining or increasing safety knowledge, and keeping workers “safety-motivated” during times of downsizing.
• Continuously evaluate whether the drain on institutional knowledge is affecting safety” (Lutgen)

SDWT can provide the structure to do all of the above items and more. SDWT provide stability, a basis for behavioral control/analysis, accountability, comfort (of other team members), and a cross-trained group of employees to eliminate role confusion, team evaluation processes, and a communication forum. Overall, SDWT can allow management to focus on properly conducting the reorganization plus the relief of a consistent structure to ensure production or service does not miss a beat, while controlling those aspects listed above that could cause injuries.

3.6.4 Teams as a Competitive Advantage

World competition requires companies to sit up and re-examine how to gain the competitive edge. Self directed work teams can provide the edge. “The self-managing team should become the basic organizational building block” if we are to win out against other world economic powers” (Orsburn et al, p6). Self-directed teams are “a planned process for giving responsibility to the people who know what to do at their level, and when to get other people involved” (Orsburn et al, p7). The chart below shows how the United States compares to Australia, Canada and Mexico in terms of applying self-directed teams for competitive advantage.
Teams provide a forum of involvement, and also provide flexibility. In the world market, “companies must be capable of producing small batches of products on a tight schedule to meet growing demands in emerging markets.” This requires “innovative technical procedures and workers that can move easily from job to job.” Self directed work teams [provide] the skills, information and motivation to adapt to change so the company can respond quickly to the changing conditions (Orsburn et al p15-16). Figure 5 illustrates how highly flexibility is ranked by manufacturers in the United States, Australia, Mexico, and Canada.
Figure 7. Overall manufacturing strategy
Executives asked which of six strategies best described their company's overall manufacturing strategy as they enter the 21st century (Lynch; Figure 1, p29)

When teams are structured correctly, “with well-defined boundaries and activities for the team, and interpersonal and teaming skills for its members – [there is] a significant competitive advantage” (Wellins, Brandt, Taninecz p9). This is supported by organizational behavior theory which “advises that self-directed work teams and other forms of employee involvement offer potential benefits for both employees and their organizations” (McShane and von Glinow p.311). The benefits include:

- Improving corporate decisions
- Improving number and quality of the solutions to organizational problems through synergy (created through teams)
- Increased probability that the best option will be selected to a problem (McShane and von Glinow p311-312)

Therefore, teams are a flexible yet structured approach to supporting a dynamic organization in today’s global markets.
3.7 Conclusion

The research thus far suggested that a team, especially if self-directed, is a tool that can encompass an organization's needs as a whole - from the individual to the entire organization. Individuals (people, employees, management, human resources) are the center of an organization. Their beliefs, values, and needs must be met, and their skills must be developed. The background information suggested that teams can provide this environment in which individuals can prosper, and help build a culture in which an organization can excel. This conclusion is based on the comparison of an organization to a house: like a house, an organization needs a solid foundation, to be decorated nicely inside, and a roof to keep out the elements. The foundation of any organization is the people, the culture is the decoration, and the teams provide the roof.

What does this have to do with improving safety? Why would an organization implement teams and how would safety be included to foster long-term improvements? The answers to these questions were the research focus for this thesis. Organizations choose their actions to complement the overall organizational strategy. The actions must be shown to add value and support the strategy, or the actions will not occur. A strategy is an action a company takes to attain one or more of its goals, ultimately trying to achieve superior performance. (Hill and Jones, p4) The strategy is what the organization deems important and provides resources for. Therefore, safety must be part of this strategy in order to be an important part of the organization, or it will most likely be unsuccessful.

To stay competitive with today's world business, the background information showed how organizations have used self-directed work teams in conjunction with
improvement programs such as behavior based safety, lean manufacturing, and six sigma. In fact, the teams in these organizations are created first, making implementation of improvement programs a successful endeavor. This success is most likely due to the self-directing nature of the teams. People in the teams feel empowered, involved and confident to make decisions regarding their actions, and understand how their actions affect the organization. Feedback is quick in a self-directed team environment -- the team members are accountable to each other and themselves to keep the team on track. It is the openness of self-directed work teams that may closely model the discipline needed for behavior based safety observations, lean manufacturing kaizen process changes and other process improvements.

Further, teams create the family-like atmosphere employees feel are lacking in today’s organizations. In a team-based environment, employees see less top-down directives, less quick fix programs, but see an increase of group goal-setting, feedback and celebrations which leads to synergy, productivity, and interdependence (Geller, “Actively Caring”).

A large percent of the background research suggests that self-directed teams have an established track record in organizationally driven needs such as productivity, cost reduction and improving employee involvement. As more and more organizations implement self-directed teams to improve safety, particularly to improve the percentage of safe behaviors, they will be ushering in a new era. This new era could include highly productive, flexible and empowered organizations, in which employees and employers experience the benefits of little to no injuries. These changes could support the secondary research focus of this thesis, providing research opportunities to determine if
employees have improved their safe behaviors because of the SDWT. Organizations could begin their quest to become top performers and be recognized as best practices in safety performance.

4.0 Methodology

This chapter deals with the methodology of the study. It provides an outline of the research approach, the methods and techniques used for the collection of relevant data (Galliers, R.D. as referenced by Roberts). The methodology was designed to forecast the answers to the research (Punch, K.F. as referenced by Roberts). In order to collect information to support this thesis statement, a qualitative approach was taken, in the form of case study. Case study is used to fully understand or illustrate an experience in a program, and to conduct comprehensive examination through cross comparison of cases (McNamara).

4.1 Goals of this Case Study

4.1.1 Determine if self-directed work teams (SDWT) achieve the motivation and accountability to reduce unsafe behaviors and ultimately reduce injuries

4.1.2 Produce a clearer understanding in how SDWT have been used in companies, and how a company’s safety performance reflects use of (or lack of) SDWT

4.1.3 Establish how a company may expand on existing teams to utilize SDWT, and how safety can be one of the activities the SDWT would be responsible for
4.2 Methodology Overview

The research was conducted in five steps, which are explained below (Roberts, survey results).

4.2.1 The first step was the literature review. This created an understanding of SDWT, including the difference between a SDWT and a traditional work team. At this step, no direct research or contact with companies that use SDWT was conducted, as the understanding was necessary in order to proceed to the next steps.

4.2.2 The second step was the creation of the surveys to obtain data. Two surveys were used: an employee survey, which provided the largest amount of data, and a management survey, which provided safety performance information for each facility.

The management survey was very easy to create, due to the availability of federal government reporting requirements (OSHA VPP Policies and Procedures Manual) and the knowledge of the participating companies reporting structures. There were eleven questions asked:

- Incident Rate
- Lost Time Incident Rate
- Severity/DART
- Total Recordables
- Total First Aids
- ISO 14001 certified
- OHSAS 18001 usage
- VPP STAR status
- % / total safe behaviors
- % discipline for unsafe behaviors

The Incident Rate, Lost Time Incident Rate, Severity Rate were chosen because most companies track these rates for federal or state requirements. Further, Total Recordables are required to complete the Incident Rate, so that was a given fact to obtain. First Aid Incidents are typically tracked by all companies in this day in age, since they drive down the number of recordable or severe incidents (Refer to
The Geller review of the Safety Pyramid, Geller "property damage"). The
management systems were included in this survey because of the following:

The following principles are embodied in the Voluntary Protection Programs
(OSHA VPP Policies and Procedures Manual):

A. Voluntarism. Participation in VPP is strictly voluntary.
B. Cooperation. VPP's emphasis on trust and cooperation between OSHA,
the employer, employees, and employees' representatives.
C. A Systems Approach. VPP participants develop and implement systems to
effectively identify, evaluate, prevent, and control occupational hazards so
that injuries and illnesses to employees are prevented.
D. Model Worksites for Safety and Health.
E. Continuous Improvement. VPP participants must demonstrate continuous
improvement in their safety and health management systems.
F. Employee and Employer Rights. Participation in VPP does not diminish
employee and employer rights and responsibilities under the OSH Act.

ISO 14000 standards are implemented by some 760 900 organizations in 154
countries (ISO 9000 and ISO 14001 in brief).

Essentially, OHSAS helps in a variety of respects... it helps: minimize risk to
employees/etc; improve an existing OH&S management system; demonstrate
diligence; gain assurance; etc. The benefits can be substantial. Therefore, the
rigors of the (OHSAS website)

The last four management questions were chosen for two reasons. 1. It
was believed they would provide a good tool to compare and contrast between
SDWT and non-SDWT companies. The assumption was that SDWT would use
more management systems, but it was proved otherwise, and is illustrated in
Chapter 6. 2. The last four questions were also chosen because they progressive
measures, meaning that they focus on the entire safety program, and do not rely
on incident rates to drive their safety program. It was questioned whether the use
of the management systems would impact employee involvement, because
employees should appreciate management taking actions without waiting for an
injury to occur. The impact was not clearly concluded from the surveys, but provided good foundation for a future research project.

The other survey used, the employee survey, was more difficult to create, due to the inherent nature of surveys: they might not get careful feedback, can cause biased responses, and don’t get the full story (McNamara, Methods). To obtain the best possible data for this thesis, the survey combined several cultural assessment surveys, behavior based safety (BBS) readiness surveys, and Voluntary Protection Program (VPP) surveys.

The questions were asked on a scale of -2 to 2:

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>-2</th>
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</thead>
<tbody>
<tr>
<td>Disagree</td>
<td>-1</td>
</tr>
<tr>
<td>Neither Agree or Disagree</td>
<td>0</td>
</tr>
<tr>
<td>Agree</td>
<td>1</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>2</td>
</tr>
<tr>
<td>No Answer</td>
<td>*</td>
</tr>
</tbody>
</table>

This scale was chosen for several reasons. One reason is based on the example surveys used to create the employee survey. It was recommended to choose a scale that would not lead the responders or bias their results. For example, a scale of 0 to 10 may lead to a large grouping of 5’s (a safe answer), 3’s or 7’s, all of which could skew the results. Also, a large scale may “scare” employee’s who are leery of surveys. A large scale creates many options. The second reason for the -2 to 2 scale was to create higher certainty in the answers. For example, it was expected that employees would either feel very strongly about the question (-2 or 2), and if they were not sure, they could answer with -1 or 1. The goal was to avoid the “safe” answer of 0 by narrowing the choices.
The survey focused on three aspects to reach the final determination of the thesis. It was these aspects which drove the types of questions asked.

1. How the employees place teams, safety, involvement, motivation, and unsafe/safe behaviors in their company. To obtain information for this aspect, questions 1-5, and 8-10 were asked.

2. How management place teams, safety, involvement, motivation, and unsafe/safe behaviors in their company. To obtain information for this aspect, management was asked the same questions as non-management.

3. The percent unsafe/safe behaviors in the organization as viewed by the management and employees, and backed by factual data if available. To obtain information for this aspect, the management survey included a request for this information. There were no questions included on the survey because it was believed the employees would not know this information, or not share the information. This was a given question anyway, since the management survey would provide the facts.

4.2.3 The third step was to identify companies using SDWT and companies not using SDWT, to enable the research and comparison between the two. In this step, an attempt was made to seek out companies with positive safety records, since they have proven methods of improving safety, and the possibility of them already using teams or SDWT to obtain involvement was high. (This assumption was made based on the OSHA VPP checklist which focuses on employee involvement.)
The initial goal was to find four companies total, two that use SDWT and two that do not use SDWT. However, it was not possible to find a large amount of companies using SDWT, which resulted in the use of three companies that do not use SDWT and one company that uses SDWT. Using only one SDWT created a limitation for this thesis, and is further explained in the methodology limitations section. Also, the Notes section explained the team structure used by the SDWT company.

The companies were not chosen based on their characteristics, what they manufacture, or the size of the company. They were chosen based on their application of SDWT, availability to safety performance information, and their overall safety performance. The reason why specific parameters were not enforced for the choice of companies is because if the companies not using SDWT have good safety performance (identified by low incident numbers, rates, etc.), the employee survey would uncover the underlying culture of the company, which may be applied to the research questions.

4.2.4 The fourth step was data collection. This was done by surveying employees at the chosen companies, and a separate survey of safety performance information completed by the safety management of the company. At first, the intent was to obtain hundreds of responses to increase sample sizes. However, the companies who agreed to participate did not feel comfortable with such a large sample population. Therefore, 10-20 responses were collected per company. The survey
was sent to the employees at the company location, and collected by the safety management team. A short turnaround time on the surveys was enforced, no longer than 5 days from the time they are received by the employees to the time they are returned to the author of this thesis, to avoid the “if you don’t use it, you lose it” theory.

4.2.5 The fifth step was data analysis. Basic statistical analysis was used to create the overall portrait of the case study. Pareto charts, behavior process charts, and other graphs are the ultimate results of the data analysis. The graphs will assist in the final conclusions of the thesis, and will attempt to answer the research questions:

*Primary Research Question:* What is the value of tying safety to self-directed work teams?

*Secondary Research Question:* How can accountability improve through self-directed work teams to ultimately improve behaviors?

To improve the validity and breadth of the survey results, the analysis was broken down into the following steps: (Leedy and Ormrod, p150):

- Details about each company were collected
- Data was categorized to help cluster data into meaningful groups
- Data was interpreted to determine relation to the case and thesis
- Patterns were identified and analyzed for relation to the case (and use during final conclusions)
- An overall “portrait” of the case was created to help draw conclusions and determine if the data has implications beyond the case study
4.3 Limitations

4.3.1 There were many constraints to the data collection and analysis of this methodology. The employees may not have been honest during the survey, despite efforts to make them feel comfortable and not requiring names on the surveys. Also, there was a lack of access and response from companies who use SDWT.

4.3.2 The time factor was a big constraint for this project. The depth and breadth of the data would have been improved through the use of on-site interviews with the employees and observation of the employees and their work environment. However, they were not possible due to conflicts with the facilities used. Interviews and observations would have allowed for direct exposure to the company’s use of SDWT or traditional work teams, and permitted factual results to support the survey responses (which are objective). Also, the lack of direct observation of behaviors may have led to missing information to support if behaviors are indeed changed by the use of SDWT.

4.3.3 The choice of companies was another limitation. The companies had different manufacturing, size, and overall approach to safety (different programs, etc.), which limited the ability to compare. If the companies had been of the same type of manufacturing, a tighter comparison could have been completed, since more similarities should be present in like manufacturing. This could have assisted with the depth of the data analysis.
4.3.4 A significant limitation was that one company was used to obtain data for SDWT. This is a limitation because when doing surveys, to identify the responsibilities of the SDWT used by the participating companies, since it was expected that safety is a duty of all SDWT. Ideally, it would have been discovered that once a SDWT is established, they create responsibilities for each team members, and one of the responsibilities would be safety. Therefore, as long as the SDWT includes safety in their daily duties, it would be given resources, priority, and attention. In most cases, when something is given consideration on a daily basis, it has an opportunity to thrive. This would ultimately lead to safety being successful and becoming a value to the company. That was the expected answer to this question.

5.0 Results

This chapter presents the results of the surveys completed. It does not provide analysis of the data. Chapter six is reserved for analysis.

5.1 Facility Data

5.1.1 A total of four manufacturing plants (also referenced as facilities) were surveyed.

5.1.2 Plant one manufactures lamps, both automotive and miniature. This plant is located in the Eastern part of the United States, and is fifty years old. The facility is about 500,000 square feet. Over 800 employees work at this plant. This is a Non-SDWT plant, but does utilize a wide variety of
teams to garner high employee involvement, especially for the safety program.

5.1.3 Plant two manufactures automobiles. This plant is located in the Midwest of the United States. This plant uses SDWT. The workforce and the facility size is the largest represented in this thesis. Over 9,000 employees, 6,800 full time and 2,200 contract/temp labor. Facility is 7.5 million square feet over 1,300 acres of land. The plant was established in 1986.

5.1.4 Plant three manufactures glass products. This plant is located in the Midwest of the United States and is fifty-four years old (established 1952). This plant is the only union facility used in the study. They do not use SDWT at this plant. Over 400 employees work at this plant, and facility covers 360,000 square feet.

5.1.5 Plant four manufactures paper and wood products. This plant is located in the Midwest part of the United States, and they have occupied their current building since 1994 (sixteen years at the time of this study). This plant is part of a company in which some of the plants use SDWT, however, this one does not. 250 employees work at this facility. Size of the facility was unknown.

5.1.6 It was decided to keep more specific facts of the participating companies confidential. It is up to the participating companies to determine if they choose to release the information obtained in the study. This was
particularly important to establish because thesis work may be published upon its completion.

5.2 Survey Results Overview

A total of 65 surveys were returned - 44 surveys were returned from non-SDWT companies, and 21 surveys from the SDWT. The limitations in Chapter 4 explained that the surveys may not have provided a complete foundation to base the analysis and conclusions on. However, as discussed further in this paragraph, statistics were used to “even out” the results, and identify questions with a high confidence rate. There were six questions with 95% confidence, and provided a significant amount of support for the conclusions in Chapter 7.

The results for each section are presented with a graph illustrating the results (bar graph, pie chart, or other) and the findings listed under the graph (SAFEmap). The results were organized into three sections for each type of data collected:

- Employee Survey
- Safety Performance Data
- Personal Information about the Responders

5.3 Employee Survey Results

The employee survey questions were grouped into Motivation, Ownership, and SDWT, and included in Appendix A. The survey used to collect data from the employees at each of the plants contained twenty-nine questions. The questions for the employee survey were analyzed according to:

- what motivates the employee to work safely
- how is safety owned in the company, and
- use of SDWT

The questions were statistically grouped and graphed. Statistics were important to analyzing the data because there was only one SDWT facility used, versus three Non-teams facilities. This created more results for the Non-teams, and statistics compensated for this large difference in the number of results. Therefore, statistics allowed the two groups to be evenly compared.

Two different types of graphs illustrate the results: bar graphs of the total answers per section, and box plots of each answer. The box plots were created using two-sample T test statistics on Minitab software. Due to the length of data, a few charts were inserted in the following pages to illustrate major points, and the full data set is in Appendix 9.3.

The questions were renumbered to 1 – 29 through the entire survey, and lettered to match the alphabet (a – z, then rz, sz, tz). Therefore, the first question is a, the second question is b, and so on. This was necessary for the statistical program used.

For each section of the employee survey question analysis, the following applies:

- The companies with SDWT are referred to as Teams; the companies without SDWT are referred to as Non-teams.
- The first columns of the box plots represent SDWT. The second columns represent Non-SDWT (Non-Teams).
5.3.1 Motivation to Work Safely

**Findings**
Motivated employees will tend to be productive, involved, and exhibit safe behaviors. The questions asked in Section A (questions 1 – 5) of the Employee Survey focused on what motivates the employees to work safely.

- Teams responded to the questions with no -2s. Only 8% of the responses were -1s or 0s. Therefore, they agreed or strongly agreed with 92% of the questions.
Non-teams had 26% of the responses were 0s, -1s or -2s. Non-teams agreed or strongly agreed with 74% of the motivation questions.

**Findings** To go home the same way I came to work
- Non-teams responded with a higher mean (average) response to this question than teams, so agreed more strongly to this question than teams.
- Teams responded with agreement, but a lower mean, so less sure of the agreement.

**Findings** To achieve my own personal satisfaction of working smart, safe and productive
- Teams responded with a mean of 1.0, while Non-teams responded with a mean of 1.5.
- Therefore, Non-teams agreed more strongly with this question.

5.3.2 **How is Safety Owned**

![Chart of OW-NONTEAM](image1)

![Chart of OW-TEAM](image2)
Findings
When employees buy in to safety, the power struggle weakens and evens out. Managers relinquish control because the employees show interest in the team. The employees feel empowered and trusted, therefore will continue to help the team meet its goals (Seaman). The questions asked in Section B (questions 6 – 17) of the Employee Survey focused on how the employees determine how safety is owned in the company they work for.

- Teams responded to the questions with no -1s or -2s. Only 33% of the responses were -1s or 0s. Therefore, they agreed or strongly agreed with 67% of the questions.
- Non-teams did respond with -2s; Actually 14% of the responses were 0s, -1s or -2s. Non-teams agreed or strongly agreed with 86% of the motivation questions.

Responses to Individual Survey Questions - Ownership

Findings Employees at this company have real influence over the direction of the company
- Teams responded to this question with more positive results, with the mean close to 1.0
- Non-teams responded with a mean less than 0.5, so were not in agreement with this question.
Findings Being responsible for safety in your company is important to you
- Non-teams responded to this question with a strong agreement.
- In comparison, Teams responded with a mean of less than 1.0, so did not agree with this question.

Findings Top management is actively involved in promoting and carrying out safety activities
- Non-teams responded with more agreement to this question, with a mean at 1.0
- Teams responded with less agreement, with a mean at 0.5.
**Findings** The safety program is well understood by all employees
- Non-teams responded with a mean close to 0.3, therefore, were not in strong agreement to this question.
- Teams responded with a mean closer to 0.9, more in agreement.

5.3.3 **Use of SDWT**
**Findings**

Self-directed teams are “a planned process for giving responsibility to the people who know what to do at their level, and when to get other people involved” (Orsburn et al, p7). The questions asked in Section C (questions 18 – 29) of the Employee Survey focused on how the employees determine how safety is owned in the company they work for.

- Teams responded to the questions with no -2s. Only 24% of the responses were -1s or 0s. Therefore, they agreed or strongly agreed with 76% of the questions.
- Non-teams did respond with -2s; Actually 29% of the responses were 0s, -1s or -2s. Non-teams agreed or strongly agreed with 71% of the motivation questions.
Responses to Individual Survey Questions - SDWT

Findings My company uses self-directed teams
- There is a very large discrepancy between the responses of Teams and Non-teams for this question.
- Non-teams responded with less agreement to result in a mean of 0.3. They hardly agreed with this question.
- Teams responded with much more agreement resulting in a mean of 1.5, which is close to a strong agreement with this question.

Findings My company uses safety teams
- Both Teams and Non-teams agreed with this question.
Findings

Over 50% of employees are involved in teams.
- Non-teams responded to this question with a mean less than 1.0, so they barely agreed with this question.
- On the other hand, Teams responded with a mean at 1.5, so they were in agreement with this question.

Findings

Over 75% of employees are involved in safety teams/improvement ideas.
- Non-teams responded in little to no agreement with this question – the results were a mean of less than 0.
- Teams responded with a mean of 1.2, fully agreeing with the question.
**Findings** There is a common sense of purpose among the employees
- Very similar responses from Teams and Non-teams. They both had a slight agreement with the question, averaging 0.5 responses.

**Findings** There is agreement on the basic human values we consider important to guide our work
- Very similar responses from Teams and Non-teams. They both had a slight agreement with the question, responding with a mean of 0.7.
**Findings** Employees are organized in a way that best supports achieving the company's core mission
- Neither Teams nor Non-teams agreed completely with this question, since means were less than 1.0
- However, Teams responded in more agreement.

5.4 **Safety Performance Data**

The survey used to collect safety performance data was completed by the safety coordinator or manager for the plant, and was not used to collect subjective data. The results were grouped and graphed according to survey question similarity. The graphs and findings are presented in the order listed below:

- Incident Rate, Lost Time Incident Rate, Severity/DART
- Total Recordables, First Aids, Near Misses
- ISO 14001, OHSAS 18001, and VPP STAR
- Behaviors
Incident Rate, Lost Time Incident Rate, Severity/DART

DART = Days Away with Restricted Time
LTI Rate = Lost Time Incident Rate

These rates are based on the following equation: \((N \times 200,000)/\text{total hours}\)
- \(N\) represents the total number of incidents or total days lost due to injury or restriction
- Total hours are the hours worked by all employees during calendar year
- 200,000 is based on 100 full-time workers working 40 hours per week, 50 weeks per year

With the four participating companies:
- Two of the four track near misses
- All four track first aid injuries
- Two of the four track severity rate

<table>
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Explanation: In today’s world, there are several expectations the general public has of companies, to prove their commitment to the environment and their employee’s safety and health. They are all voluntary commitments, and include:

- Certification to the International Standards Organization (ISO) environmental and safety standards. The most recognized certification is ISO 14001, the environmental standard.
- Occupational Health and Safety Administration System (OHSAS) 18001
- OSHA VPP

Findings: The four participating companies have the following:

- Three of the four are ISO 14001 certified
- One of the four have implemented 18001
- One of the four is VPP Star and another in May 2006
Recordable Injuries are required to be reported to OSHA by any company of over eleven employees. They are injuries where (for example) broken bones, stitches, loss of consciousness, or prescription medicine are required.

First Aid injuries are not required to be reported to OSHA. They are minor injuries like bruises and scrapes.

Near miss incidents do not involve a person being injured, but are considered the step before an injury, where an unsafe condition or unsafe behavior must be corrected to prevent an actual injury.

The participating companies had an interesting response:
- Three of the four had two or less recordables
- Two of the four track near miss incidents
- All four track first aid injuries

5.5 Personal Responses
Findings
- The facility with SDWT had a larger percentage of employees from the 6–20 year range, with no responders in the 21+ year range.
- The Non-SDWT facilities had a larger range of responder seniority, with 36% of the responders in the 6–20 year range, and 36% in the 21+ range.

6.0 Analysis and Discussions
6.1 Management Survey Findings

**Incident Rate, Lost Time Incident Rate, Severity/DART**

This grouping of questions did not provide results that could be clearly compared or contrasted. The incident rates showed that all four companies operate under the industry standard of 6.6 injuries per 100 workers (BLS), and none of the four companies track Severity and DART rates. These are just numbers, and do not point to any patterns or trends for which to analyze. An assumption could be made that because all four companies having positive safety performances, they must be making safety a priority, or they would not reap a successful safety program. However, this assumption can not be proven by the numbers. The results do not support whether companies who track all three of these measures impacts employee behavior and motivation.

**Total Recordables, First Aids, Near Misses**

As discussed in the literature review, the general understanding is by reducing near miss and first aid incidents by controlling unsafe conditions and behaviors, serious injuries or even deaths can be avoided. Heinrich proposed more than 60 years ago a 300-29-1 ratio between near-miss incidents, minor injuries, and major injuries. Since then, safety professionals have been encouraged to investigate near-miss incidents in order to reduce minor and major injuries. Heinrich also estimated that 88 percent of all near misses and workplace injuries resulted from unsafe acts. The only difference between most near-miss experiences and an injury is timing or a few inches. Searching for root causes of near-miss experiences and following up with corrective action will certainly lead to lower injury rates (Geller – Property Damage).
The importance of this information is that all four companies track first aids, but only two track near miss incidents. Therefore, they are all 50% closer to improving on their safety performances. This supports why these four companies were chosen for the thesis – safety is already important to them, and would cause the results to be more true to the employee’s feelings about the SDWT, not being angry about a poor safety program.

**ISO 14001, OHSAS 18001, and VPP STAR**

The methodology included an explanation of why these questions were asked. They have a direct impact on what the management of the participating companies does about safety. These three management systems are very visible to the public, and are required by many companies. However, it was interesting to find that the non-SDWT have more of these certifications than the SDWT company. In fact, the SDWT company only has ISO 14001 certification. More importantly, this does not impact the safety performance or the fact that the employees are very motivated to be safe for themselves and their fellow employees. Overall, a good piece of information to show that management systems can be important to a safety program, but not necessarily to obtaining motivation and employee involvement in a safety program.

**Behaviors**

The companies do not track behaviors. There were no results to support why they do not track behaviors, since motivation and involvement seems high across all four companies. No real conclusions could be made, but an assumption is companies do not embrace behavior based safety and SDWT because it takes too long to see a
difference, at least two years. An opportunity for future research on this subject of SDWT, safety performance, and Behavior Based Safety is explained in Chapter 8.

6.2 Discussion of Employee Survey Results by Survey Category

The employee survey questions were broken into three categories: Motivation, Ownership and SDWT. The discussion of how the results address the thesis subject is organized to address each category separately. Each question was analyzed to determine trends and comparisons across SDWT and Non-teams. There were also questions on the survey with personal data, and these results were further analyzed to determine if length of time in job, job title, or involvement with safety teams/programs had an impact on the responses for that person.

6.2.1 Responses to Motivation Questions

Overall, Teams (companies with SDWT) agreed more positively to the motivation questions, with only 8% of the responses less than agreement (less than 1).

When the responses to the questions were analyzed, in many cases, SDWT versus Non-team companies exhibited the results that were expected. For example, over 92% of the responses from SDWT were in agreement with the motivation questions, versus 74% of Non-teams. The overall statistical results suggest that SDWT are more motivated to work safely. However, when analyzing the individual questions, it is not as apparent what actually motivates SDWT, since SDWT had a lower mean response on all but one question (to help the company achieve its goals).
Questions 2, 3, and 4 were very similar in response, so a large difference was not analyzed.

This is not the case for question 5 – “To achieve my own personal satisfaction of working smart, safe and productive.” SDWT responded at a mean of 1.0, which is just flat agreement. Teams responded with a mean of 1.5, a stronger agreement. This difference may be slight, but it may support how SDWT work together for a common goal as compared to individual teams with individual goals.

6.2.2 **Response to Ownership Questions**

Overall, Teams (companies with SDWT) agreed more positively to the ownership questions. They did not respond with answers less than 0. This could be explained by the fact that SDWT require employee empowerment, and SDWT are completely driven by the employees.

When the individual responses to the survey questions were analyzed, a picture was painted of what SDWT and Non-teams think of ownership for safety, even though the results for ownership were not as clear cut as the motivation questions. There were some questions which SDWT answered with less certainty where more certainty was expected. Regardless, the overall expectation was that employees would state low ownership in their safety.

In fact, the results suggest that employees do feel ownership, regardless of the use of SDWT. The responses to questions 6, 7, 10, 12, 13, 14, and 16 were very close between SDWT and non-teams. These
questions focused on what the company does (or doesn’t) do to involve and communicate, and what the employee does to correct and identify unsafe behaviors in their workplace, whether their behaviors or someone else’s. SDWT and non-teams both responded in slight agreement (a mean of less than 1.0) for all of these questions.

Question 8 showed a large difference in responses – “Employees at this company have real influence over the direction of the company.” Teams responded with a mean of 1.0, while Non-teams responded with 0.5, meaning that Teams fully agreed with the question, while non-teams did not. Although a large difference, this was the expected response due to the discussion earlier of why the four companies were chosen and what they have in place for safety and general management system use.

Question 9 also showed a large difference - “Being responsible for safety in your company is important to you.” Non-teams responded in strong agreement to this question, while SDWT did not agree. This was a surprise result, as one would have expected SDWT to feel very responsible for safety in the company they work for due to the accountability required for SDWT. Non-teams can be an individualistic environment, taking responsibility for individual safety. However, SDWT should feel responsible for safety if it is part of the team’s goals. The results may be explained if the SDWT do not include safety as a part of the team’s goals, or lack focus on safety as part of the goals.
Question 11 also resulted in a large difference—"Top management is actively involved in promoting and carrying out safety activities."

SDWT do not need management to be involved in their safety activities, since they are "self-directed." Therefore, SDWT responded to this question with much less agreement than Non-teams, with a mean response half (0.5) of Non-teams (1.0). This may be because Non-teams rely on the chain of command for daily activities, including safety, while SDWT involve safety in their every day duties. There is no chain of command. Thus, this question had an expected result.

Question 15 ties to how a company’s commitments affect the use, or lack thereof, SDWT—"Employees are made aware of evaluations made on the company’s safety system." This question tied to the safety performance results. One of the questions asked on the management survey was the status of ISO 14001, VPP, and 18001 certifications. Every plant had at least 1 or more of these certifications. These certifications require employee involvement and evaluation of the system progress at least annually. Therefore, question 15 should have resulted in both SDWT and non-teams to agree with this question. However, there was a slight discrepancy, in which SDWT responded with a mean less than 1.0 versus a Non-team mean of 0.7. Regardless if SDWT are used or not, the employees should be aware of the system evaluations, so this uncovered an improvement opportunity for the SDWT.
Question 17 prompted responses to show the nature of SDWT –
“The safety program is well understood by all employees.” Ideally, this question should have been answered in strong agreement, since that would reflect all four participating companies having strong safety programs regardless of the status of SDWT. However, there was a 0.6 point difference in responses, with Non-teams at a mean of 0.3, and SDWT at 0.9. These results may reinforce use of SDWT because the strength SDWT have to educate and communicate with the employees, creates a close-knit group with regular, consistent contact. Non-teams do not involve all employees, and some employees are “left out in the cold,” not knowing the status of safety or any other programs in the facility. The results of this question may have identified the best use of SDWT, and supported the use of SDWT in a company to improve employee motivation and ownership with safety.

6.2.3 Responses to SDWT Questions

Overall, this section of questions met the expectations – either the responder worked for a company with SDWT or not, and this status affected the responses. The analysis of these questions was a crucial piece for the thesis, since it provided support for the use of SDWT by illustrating the positive impact on a company.

Question 18 produced the most obvious result – “My Company uses self-directed work teams.” The results were either to agree or not,
and obviously, SDWT responded highly while Non-teams responded without agreement.

The next question took the responders a different path – “My Company uses safety teams.” It was expected that both SDWT and Non-teams would respond highly to this, due to the fact that some states actually require safety teams, and the ISO certifications also require some form of employee involvement, which is typically captured in safety teams. The response was as expected – means over 1.0 for both SDWT and Non-teams.

Questions 20 and 21 asked how many employees (50% or 75% respectively) were involved with safety teams. Unfortunately, the survey had a misprint, and Question 20 did not ask about safety teams; it just asked for teams, so the responses were not as easy to compare. Non-teams were expected to have a smaller percentage of employees involved in safety teams/improvement ideas, since Non-team companies traditionally have a core group of employees involved in teams. However, non-team responders claimed that 50% of the employees were involved with general teams. SDWT responded to both of these questions with full agreement, which was expected due to the high levels of involvement needed in SDWT environments. The reason for including these questions was to truly see how involved the employees were in the safety programs and if there was a difference. The results suggest that SDWT improve involvement.
Question 22 produced unexpected results—"There is a common sense of purpose among employees." It was expected that SDWT would have high sense of purpose versus a low sense of purpose in Non-teams because in SDWT, all team members have a duty/purpose. However, both sides responded similarly, leading to further analysis. When built correctly, SDWT should have a high sense of purpose, since they are self-directed and control their destiny. It may be that the SDWT used in this study may need some restructuring, education, or evaluation, to determine where the weakness is causing the responses to this question.

Responses were as expected to Question 23—"I have written objectives for my own work." Non-teams did not agree with the question, while SDWT did agree. In fact, Non-teams responded with less than half of the mean of the SDWT. This is directly related to the structure that SDWT have, in which they operate under rules and procedures. Non-teams have guidelines and operating procedures too, but the difference is that in Non-teams, a Supervisor or Manager is calling the shots, collecting the data, etc.

Questions 24, 26, 27, and 28 showed similar responses between SDWT and Non-teams. These questions were looking for how SDWT and Non-teams respond to customers, have their basic human values upheld, are given action plans, and are organized to support the company’s core mission. These results were either the same or within 0.3 of the mean, which supported the expectation that if any of the companies participating
in the case study have great safety performances, it will be discovered that they have some formal teams established to meet the employee’s needs and establish some sort of structure to meet responsibilities.

The last question warrants discussion too – “Employees receive adequate training to enable us to reach our objectives.” Both SDWT and Non-teams agreed with this question with a mean of 1.0, which showed a weakness in the education of the SDWT. SDWT require intense training to ensure they can conduct every duty that a Supervisor typically would. Without this training, they will be ineffective and become frustrated to not meet objectives they have set for both them and the company.

6.2.4 Personal Responses

A statistical analysis was not completed to gather these results; they are based on pure number of responses and a subjective analysis of the results. More study could have been done to determine the motivation and involvement levels of those with more or less time with a company. There could be information there to prove that motivation and involvement will decrease over time, according to the results found by the survey in this thesis. The SDWT responded with more positive responses to the motivation questions, so the decrease of motivation could be seen by the Non-SDWT.

One of the facilities had a “greener” workforce, with the average years of service at the 1 – 10 year mark. This facility did have less positive results, meaning more results were -1s, 0s, and 1s. This facility
also included their employees the best, not just letting management do the survey. They had the best sampling of employees, probably getting the best representation of the facility's feelings about safety and SDWT.

The facility who is VPP Star had more experienced employees, with 16 – 21 years of service with the facility, and they had more positive responses. However, it was all management employees who did the survey, which may have led to results not true to the entire workforce.

Another facility also had very good responses, meaning the responses seemed to be the most honest. The responses for this facility were mostly 0s and 1s, with some -1s.

The SDWT facility had a great range of employee job titles and years of service. It seemed that those with more years with the company responded more negatively, with more 0s and 1s than those with less than 10 years with the company.

7.0 Conclusions

7.1 Research Questions

These questions guided the case study information as it was gathered. The intent was to collect data to answer these questions, which would provide support for or against the thesis statement.

Primary: What is the value of tying safety to self-directed work teams?

The data collected did not directly illustrate if safety can be added to SDWT responsibilities and be a value-added step for a company. In order to
answer this question, a large step was taken to the following conclusion: SDWT
can stabilize the process of safety improvement in three ways: 1. SDWT bridge
the culture gap; 2. SDWT can sustain the safety process; and 3. SDWT can
motivate the employees to exhibit safe behaviors.

1. Organizational culture is the “basic pattern of shared assumptions,
values, and beliefs governing the way employees … think about and
act on problems and opportunities” (McShane and von Glinow, p498).
This suggests that if a company’s culture is to place production before
safety, use top-down (traditional management structure) decision
making, and use teams only when problems arise, the employees will
think, act, and be reactive in the same way. The surveys suggest that
employees who work in SDWT feel more ownership for the safety of
themselves, as well as more influence on the company’s direction. It
is also suggested through the survey results that employees in SDWT
are motivated to be safe and over 75% of the employees in SDWT are
involved in safety improvement ideas. Together, the overall survey
results suggest employees in SDWT should be safer and more
involved in all aspects of the company’s operations. On the other
hand, employees in Non-SDWT responded with less agreement: they
did not feel influence over the company direction, nor were they
motivated to be safe, and less than 50% were involved in teams. The
results of the two groups (SDWT vs. Non-SDWT) suggest that there is
a large culture gap of an involved, motivated, safe company, and SDWT can provide a stronger, more lasting bridge over this gap.

2. Sustain a stable safety process refers to the “flavor of the month” phenomenon many safety programs encounter. This phenomenon degrades a safety program in two ways: it creates blips or waves of good safety performance and bad safety performance, and pushes senior employees away from being involved and motivated to be safe. The goal of most safety programs is to avoid the pitfalls of working many days without injuries, with high employee morale and involvement for safety, then have one instance, like a layoff or job movement, cause the safety performance to crash. Changing the company’s approach to safety, like through a new program, and not providing a lasting method to sustain the positive changes, is what can lead to the demise of a good safety program. And, all the while, senior employees who have gone through the ups and downs for years will slowly back away, uninvolved and uncaring about the situation. This effect on the senior employees is suggested through the survey results, which showed that senior employees may lose interest in the safety program because of the flavor of the month. The use of SDWT can provide both the long-lasting structure and the involvement, which could counteract the implementation of different safety efforts. For example, if a company chooses to roll out behavior based safety, the SDWT could provide the means for which to successfully do so, with
the employees already involved and responsible to a certain area of the facility or production line. Senior employees would more than likely be a group leader in a SDWT based organization, which would keep them interested and involved.

3. SDWT can motivate employees to be safe through accountability and the team structure. For example, the SDWT organization used for this thesis has several layers in each group. Each layer has a different responsibility, whether to ensure production goals are met, or report results to the assistant manager, or even to do the hands-on work. Regardless of the team member’s role, there is structure, accountability, and a vision which applies to the entire team. They work as a team and are accountable as a team. Therefore, it is more than likely that the employees are motivated to work productively. In order to be productive, this would suggest that the team must work as a whole, and if someone were to be injured or disciplined for unsafe behavior, a void would occur in the team. This would probably affect the team output. Therefore, the team members are probably encouraged to work safely, to not let the team down.

Secondary: How can accountability improve through self-directed work teams to ultimately improve behaviors?

The expected results of this thesis were that self-directed work teams (SDWT) have a positive impact on improving safety performance through safe
behaviors. The positive impact would be seen through the accountability, motivation, structure, and integration of safety into day-to-day tasks. All of these actions would be established through the SDWT because they set their rules, vision, and actions based on their responsibilities. They are ultimately accountable for their actions and results.

Since SDWT should inherently require accountability to be successful, the answer to this research question should be yes. However, none of the participating companies tracked safe behaviors, so it could not be shown if behaviors were impacted by the use of SDWT. Therefore, it was necessary to determine how SDWT are used by the one participating company, including responsibility distribution, scope, vision, and general team results. This enabled a deeper look into the answers of the employees who are part of SDWT.

The company used to represent SDWT in this thesis used the following team structure: all employees, salary and hourly, are in teams. These teams are typically organized into sections (based on the production flow) and structured as follows (ranked in order of highest responsibility to lowest not including CEO, VP, CFO): floor manager, assistant manager, group leader, team leader, team members. In areas such as Safety, Engineering, etc., a specialist would be added to the group, probably due to the inherent nature of knowledge and specialized skills required for the tasks in the team. The vision for the team is sent down to each department from the company vice president, which includes targets. From there, each section develops a business plan, which will determine how they will meet each of the targets and the vision.
This approach to SDWT suggests a completely involved company, from top to bottom, allowing all employees to impact the company's results through the business plan and team structure. In this company, accountability is probably achieved through the communication methods used from the teams to the managers to the upper management of the company. To assure accountability, constant communication is upheld through strict time management in the production lines and daily communication forums between the assistant managers and floor managers. However, how behaviors are tied into this accountability and involvement was not clear. It is possible that because of the SDWT responsibility structure, the methods of communication, accountability and involvement, unsafe behaviors are kept in check.

The third contribution listed in the next section could also support this research question. In the third contribution, it is described how SDWT could be used to increase safe behaviors, based on the survey results which suggest SDWT increased motivation, involvement, and ownership for safety in the company who used them at the time of the survey.

A disclaimer to this research question is that acting safely for self is only half the battle; helping others act safely is the other half. The survey results suggested that SDWT had no impact on accountability or motivation to help others act safely. Even if safety is a duty of one of the SDWT members, they may not help their fellow team members be safe. This would have little to no impact on improving safe behaviors in the plant, and could disprove the answer given.
above. The leap taken to answer research question one applies here too: SDWT can motivate employees to be safe, which could lead them have safe behaviors.

7.2 Summary of Contributions

7.2.1 SDWT Improve Motivation

"Most humans will not change their beliefs, habits, or behaviors unless they are motivated to do so" (Grazier). So, in order for companies to improve safety, they must motivate their employees. The survey results suggested that the participating company who uses SDWT has a more motivated crew. The SDWT answered the section of questions on Motivation at 92% positive. They strongly agreed that they must be safe for their company and their co-workers, as well as for their families and personal satisfaction of working safely and productively.

This encouraging information supports the use of SDWT to increase motivation. SDWT usually allow employees to take ownership of their daily duties, and provides the structure for achievement, advancement, recognition, and responsibility, all which are motivating factors (Envision). Without these motivating factors, employees would respond more selfishly, focusing on keeping themselves safe, and not on helping the company prevent injuries to other employees. This was seen through the Non-team survey results for the section of Motivation questions. Non-teams responded with only 74% agreement, with the
highest scores for the last question "to achieve my own personal satisfaction of working smart, safe, and productive."

So, the survey results illustrated how SDWT may improve employee motivation, but it is equally important to discuss how the increased motivation could impact employee behaviors. "Most humans will not change their beliefs, habits, or behaviors unless they are motivated to do so" (Grazier). In other words, increased motivation to be in a team, where responsibility includes being safe, should equal a change in behaviors, which will create a safe employee.

The conversation regarding the importance of increasing and maintaining motivation could continue forever. Therefore, it is necessary for a final statement regarding the relationship of motivation and increasing SDWT, the primary research focus of this thesis. SDWT motivate employees to think about their actions, how their actions impact the team, and what they can do to make the team more successful through accountability and structure.

7.2.2 Most employees want to be safe. SDWT can be used to build on this inherent desire.

The preceding contribution focused on how successful SDWT were at motivating employees. For clarification, it must be stated that motivation is the drive to be part of the team, be successful, and productive. A deeper look into the survey results shows that SDWT did
not have a large impact on employee’s safe behaviors. In fact, Non-teams answered with more agreement or the same agreement to many of the Ownership questions and with more certainty to the “being responsible for safety is important” question.

Therefore, the results support a statement made early in this thesis: “Unsafe behaviors are not necessarily purposeful acts by a person. If a person knows an injury is likely to occur as a result of an unsafe behavior, it would be logical that they should be motivated to behave safely without external pressure to do so”. When this statement was made, it was based on speculation (and hope) that people really want to be safe every day. The results suggested that people do want to be safe, and a SDWT may not be needed to make them feel this way. Question 4 on the survey asked if “To live a long and healthy life outside of work” motivated the responder. This was the one question in the entire survey where both SDWT and Non-teams responded with overwhelming agreement.

So, if people inherently want to be safe every day, we have to find ways to tap into this inherent need or desire. Companies may choose to use safety teams, work teams, SDWT, or focus groups, but any of these could provide the way to keeping the employee’s needs of being safe.

This result doesn’t discount the fact the SDWT may provide a better foundation for motivation, which could meet the needs of the employee on a deeper level; it suggests that companies who are striving to improve their safety performance can start the uphill battle through SDWT.
Self-directed work teams can bridge the gap to ensure the necessary requirements to a safety culture change. They require the entire organization to work together, and commit to the success of the teams. The literature review discussed how safety program success hinges on employee involvement and management commitment. SDWT can allow for employees at all levels to communicate and support the success of the safety program, plus they can be used for production, service, and all other aspects of a product life cycle. Therefore, SDWT should be able to support a positive safety performance change through the commitment, communication, motivation, and overall team-environment.

The determination of whether SDWT build on people’s inherent desire to be safe, two questions on the employee survey are noted: Question 20, “Over 75% of employees are involved in safety teams/improvement ideas,” and Question 19 “Over 50% of employees are involved in teams.” The statistical process used for the survey results showed 95% certainty that SDWT answered these questions with more positive answers, and is further illustrated by the box plots. Of course, involvement in teams does not mean people feel or act safer. These results support the conclusion that companies with SDWT have employees who are 75% involved in safety teams, and the teams can provide an avenue for the employee’s needs to be met.

"People want to work safely all the time when they believe their jobs are important and that safety is a value integral to competent
performance" (Geller 2003). Teams create the family-like atmosphere employees feel are lacking in today's organizations. In a team-based environment, employees see less top-down directives, less quick fix programs, but see an increase of group goal-setting, feedback and celebrations which leads to synergy, productivity, and interdependence (Geller, "Actively Caring"). SDWT may take this a step further, by allowing the employees freedom to create their own schedules, vision, and control their destiny, instead of relying on supervisors or top-management to make the decisions for them. This is what could tap into the inherent desire to control themselves and their environment. The employee can create the safe environment, the road to get there and stay there. [The last statement is a good example of the relationship discussed in the research questions: SDWT can provide a three pronged attack to stabilizing a safety program – motivate, bridge the gap, and sustain.]

If a company cannot implement SDWT but want to in the future, they can start by motivating employees to care about their own safety through traditional work teams. This would get the employees used to a structure, including responsibilities and a vision. The teams could then be formed into SDWT when the company seems ready to do so. Note: To test for SDWT readiness, there are surveys available and Orsburn has an entire section on checking readiness (Orsburn p239). By establishing a structure for the employee, they can get a taste of the freedom and control they can have. This could be a foundation to SDWT, as well as meeting
the employee's desire to be part of a successful machine with a positive impact on their life and the company's.

7.2.3 **SDWT can be used to increase safe behaviors**

The surveys provided support for the use of SDWT to motivate employees. The motivation survey questions (questions 1-5) suggested that SDWT have increased motivation to work safely. Questions in the motivation section also suggested that SDWT do not strive for personal satisfaction, probably because the team’s purpose is most important, since it is what helps meet the personal needs of the team members. The last group of questions, “SDWT questions,” suggested that employees who work in SDWT have a real influence over the company’s direction, with high levels of involvement. The SDWT are given complete ownership over their tasks/jobs. Therefore, the teams are a direct function of the company, so if they do not function productively, the company may not either.

The influence over the company’s results is what makes the involvement question answers so interesting. The results support two things: 1. In order to promote safe behaviors, a person must be motivated and encouraged to act safely (Gilmore, Perdue, Wu), and 2. The Secondary Research Focus: The accountability provided through self-directed work teams ultimately improves behaviors. The employees are
accountable for their behaviors because of their role on the SDWT, since they are required to do the task as part of the SDWT duties.

This suggests that a company could in fact use SDWT to improve safe behaviors if the teams are given a set group of duties which includes safety. If the company includes behavior based safety, where the employees observe each other in efforts to give positive or negative reinforcement to behaviors, the company can begin to track if safe behaviors increase with the SDWT integrating safety into their duties.

Including Behavior based safety with SDWT duties leads to the conclusion for this contribution. Behavior based safety can create a change in how the individual does their job and “require that individuals work together, going ‘beyond the call of duty’ for one another” (Gilmore, Perdue, Wu). The surveys showed SDWT employees are motivated to be safe as individuals. Together, these two means create the end: employees who are not at the status quo and want to be safe equals increased safe behaviors. This conclusion is as final as we can get without further research into Behavior based safety and SDWT, since none of the four participating companies tracked behaviors.

7.3 **Future Research**

7.3.1 **Behavior Based Safety and SDWT**

One factor that caused difficulty in linking behaviors to SDWT was the lack of information linking Behavior Based Safety (BBS) to
SDWT. The participating companies did not track behaviors, which prohibited analysis of the effect SDWT may have on behaviors. The company who is using SDWT is looking into a BBS program for their facility, but have not implemented it as of yet.

A future research topic could be to dive into the use of SDWT for Behavior Based Safety. If a SDWT is already responsible for safety, which includes training, communication, injury investigation, near miss tracking, and all other aspects of a safety program, then BBS could be added. BBS is a safety tool that can be as easy or difficult as a company wants to make it. BBS can be started with training for all team members, educating the team in how the rest of the program can be implemented. A BBS program can be completely tailored to the team or the facility. As long as the entire team embraces it, BBS could be very successful. This embrace is necessary because BBS, at its core, requires employees to observe fellow employees, and document safe and unsafe behaviors according to a checklist. The good thing is it does not require the observer to document names. BBS is a positive program, not intended to be used for discipline. Therefore, it should be a positive addition to SDWT duties.

A research project could be conducted to implement BBS at a facility using SDWT and a facility not using SDWT to establish if the structure of SDWT leads to less resistance to BBS. Also, a project on just implementing BBS at a SDWT facility could be conducted, and results on
increased safe behaviors could be tracked. Either way, it would be interesting to see the results.

7.3.2 Taking the Next Step: Evolving Teams into SDWT

It was mentioned that SDWT may not be necessary to increasing a person’s desire to be safe. That statement was supported by the survey results. However, the fact still remains that self-directed work teams are the last step in the continuum. They are the last brick in the team foundation which provides a long-term solution (Chillis). At this step, involvement is high and the team is self-sufficient including hiring and performance appraisals.

Work teams evolved due to the individual’s innate tendencies to act a certain way to please a team, which ultimately pleases the individual. Traditional work teams do not provide the complete motivation for an employee to work safely and efficiently. We saw this in the survey results for the questions on Motivation, where SDWT agreed 92% of the time, versus 72% for Non-SDWT. But, it was discovered that SDWT are not necessary for an employee to want to be safe. Finding the piece of the puzzle to connect an employee’s desire to be safe with motivation which keeps them going every day seems to be the goal here. However, this thesis did not find this puzzle piece. The pieces are still disconnected.

SDWT may not critical to a safety program’s success, but they may be able to prolong or even maintain the success. Including this in the
future research section is important because this thesis was not able to turn the “may be able to” into “can.” The research uncovered the possibility of SDWT being a viable tool in a company’s long-term operating plan, but the thesis results did not focus on this opportunity.

Therefore, a future research project could be conducted to collect data on a company with existing traditional work teams, and their steps into the SDWT world. A researcher could assist a company with implementing SDWT, and track employee attributes such as motivation, personal needs met (job security, acceptance by others, etc.), and behaviors toward the job and the employee’s safety. Data could be collected and analyzed at many different levels, since there is really no existing data tracking a company’s movement from traditional work teams to SDWT.

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9.0 Appendices

9.1 Survey sent to Employees – complete file available upon request

SECTION A: What Motivates You to Work Safely?

<table>
<thead>
<tr>
<th>Think about what makes you (family, friends, etc.) work safely when you step through the doors of the plant ...</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree or Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. To help the company achieve its goals .........................</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>2. To go home the same way I came to work .................</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>3. To not create unsafe conditions for my co-workers .................</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>4. To live a long and healthy life outside of work ..........</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>5. To achieve my own personal satisfaction of working smart, safe and productive ...............</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

SECTION B: How is Safety “Owned” in the Company You Work For?

<table>
<thead>
<tr>
<th>Think about who walks the talk with Safety, who Gets the Job Done...</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree or Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The company makes a sincere effort to share information with employees ........................................</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>2. This company encourages people to participate in decisions that affect their day-to-day work ........................................</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>3. Employees at this company have real influence over the direction of the company ........................................</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>4. Being responsible for safety in your company is important to you ........................................</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>5. I feel an obligation to challenge poor performance of my fellow employees ........................................</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>6. Top management is actively involved in promoting and carrying out safety activities ........................................</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>7. There are clearly assigned safety responsibilities from top management to line supervisors to workers ........................................</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>8. Adequate resources, including authority, are provided to meet responsibilities ........................................</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>9. Employees are involved in at least three ways (activities, decisions) that impact their safety and health ........................................</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>10. Employees are made aware of evaluations made on the company’s safety system ........................................</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>11. Safety concerns are integrated into the overall business ........................................</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>12. The safety program is well understood by all employees ........................................</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
SECTION C: The Use of Self-Directed Teams
This section applies to all company programs, not just safety. Think about what your company does to involve, train, and empower employees...

1. My company uses self-directed teams
   Strongly Disagree Disagree Neither Agree or Disagree Agree Strongly Agree
   o   o   o   o   o
2. My company uses safety teams
   o   o   o   o   o
3. Over 50% of employees are involved in teams
   o   o   o   o   o
4. Over 75% of employees are involved in safety teams/improvement ideas
   o   o   o   o   o
5. There is a common sense of purpose among the employees
   o   o   o   o   o
6. I have written objectives for my own work
   o   o   o   o   o
7. Key internal and external customers are identified
   o   o   o   o   o
8. There is a written vision statement for day-to-day work at our company
   o   o   o   o   o
9. There is agreement on the basic human values we consider important to guide our work
   o   o   o   o   o
10. There are written action plans for achieving company objectives
    o   o   o   o   o
11. Employees are organized in a way that best supports achieving the company's core mission
    o   o   o   o   o
12. Employees receive adequate training to enable us to reach our objectives
    o   o   o   o   o

SECTION D: Personal Information
1. How long have you worked at this company?
   o   Less than 1 year  o   1 - 5 years
   o   6 - 10 years   o   11 - 15 years
   o   16 - 20 years  o   21 or more years

2. What is your job title?
   o   Maintenance  o   Engineer
   o   Product Line Worker  o   Administrative
   o   Line Supervision  o   Other _____________

3. How long have you been in your job title?
   o   Less than 1 year  o   1 - 5 years
   o   5 - 10 years   o   11 - 15 years
   o   16 - 20 years  o   21 or more years

4. What types of safety-related teams have you been involved in?
   o   Plant Safety Team  o   New Product Team
   o   Process Change Team  o   Incident Response Team
5. Have you been/Are you part of a self-directed team? (If no, go to question 8)
   o Yes
   o No

6. What is your role in the team?
   o Safety
   o Notetaker/recordkeeper
   o Time Keeper
   o Facilitator
   o Scheduler
   o Other ______

7. How effective is your team at the following:
<table>
<thead>
<tr>
<th></th>
<th>Not Effective</th>
<th>Somewhat Effective</th>
<th>Very Effective</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Communication about goals, objectives, vision for the team</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Conflict Resolution</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Constructive Feedback to team members who are observed acting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Providing equal sharing of responsibilities for the team</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8. What is your company's safety record like?
   o Below Average
   o Average
   o Very Good
   o OSHA VPP Star
   o Other ______

9. Your name (Optional but helpful!)
   ____________________________________________

10. Can I contact you via phone if more information is needed?
    o Yes
    o No
    If Yes, provide work phone number ____________________

9.2 Survey Sent to Management - complete file available upon request
9.3 Survey Results – Box Plots

Findings: To help the company achieve its goals
- Teams had a slightly higher mean response at 1.2, showing they agreed more with the question than Non-teams.

Findings: To go home the same way I came to work
- Non-teams responded with a higher mean (average) response to this question than teams, so agreed more strongly to this question than teams.
- Teams responded with agreement, but a lower mean, so less sure of the agreement.
Findings To not create unsafe conditions for my co-workers
- Non-teams responded with a higher mean (average), but both Non-teams and Teams agreed with this question.

Findings To live a long and healthy life outside of work
- Non-teams responded with a higher mean (average), but both Non-teams and Teams agreed with this question.
**Findings** To achieve my own personal satisfaction of working smart, safe and productive

- This graph showed a large discrepancy between Teams and Non-teams. Teams responded with a mean of 1.0, while Non-teams responded with a mean of 1.5.
- Therefore, Non-teams agreed more strongly with this question.

7.3.3 **How is Safety Owned**

**Responses to Individual Survey Questions - Ownership**
**Findings** The company makes a sincere effort to share information with employees
- Non-teams responded to this question with a mean of 1.0
- Teams responded with a mean of less than 1.0
- A mean of less than 1.0 corresponds to less agreement with the question.

**Findings** This company encourages people to participate in decisions that affect their day-to-day work
- There was not a large difference in the mean between Teams and Non-teams – both responded with a mean close to 1.
**Findings** Employees at this company have real influence over the direction of the company
- Teams responded to this question with more positive results, with the mean close to 1.0.
- Non-teams responded with a mean less than 0.5, so were not in agreement with this question.

**Findings** Being responsible for safety in your company is important to you
- Non-teams responded to this question with a strong agreement to this question.
- In comparison, Teams responded with a mean of less than 1.0, so did not agree with this question.
Findings I feel an obligation to challenge poor performance of my fellow employees
- There was not a large difference in the mean between Teams and Non-teams – neither agreed with this question, resulting in a mean between 0.3 and 0.7 (less than 1.0)

Findings Top management is actively involved in promoting and carrying out safety activities
- Non-teams responded with more agreement to this question, with a
Teams responded with less agreement, with a mean at 0.5.

**Findings** There are clearly assigned safety responsibilities from top management to line supervisors to workers.
- There was not a large difference in the mean between Teams and Non-teams, with a mean between 0.7 and 0.8, which is less than agreement.

**Findings** Adequate resources, including authority, are provided to meet responsibilities.
- There was not a large difference in the mean between Teams and Non-teams, a mean between 0.8 and 0.9, which is less than full agreement.
Findings

Employees are involved in at least three ways (activities, decisions) that impact their safety and health:

- There was not a large difference in the mean between Teams and Non-teams – both responded to this question with a mean between 0.7 and 0.8, which is less than agreement with the question.
**Findings** Employees are made aware of evaluations made on the company's safety system

- Non-teams responded in more agreement to this question, with a mean almost at 1.0
- Teams responded with a mean at 0.7, which is less than agreement with the question.

**Findings** Safety concerns are integrated into the overall business

- Non-teams responded with a mean over 1.0, therefore, they agreed more strongly with this question.
- Teams responded with a mean less than 1.0, so were not as agreed with this question.
**Findings** The safety program is well understood by all employees
- Non-teams responded with a mean close to 0.3, therefore, were not in strong agreement to this question.
- Teams responded with a mean closer to 0.9, more in agreement.

7.3.4 Use of SDWT

**Responses to Individual Survey Questions - SDWT**

Findings My company uses self-directed teams
- There is a very large discrepancy between the responses of Teams and Non-teams for this question.
- Non-teams responded with less agreement to result in a mean of 0.3. They hardly agreed with this question.
- Teams responded with much more agreement resulting in a mean of 1.5, which is close to a strong agreement with this question.
**Findings** My company uses safety teams
- Both Teams and Non-teams had a mean between 1.0 and 1.5, therefore, both agreed with this question.

**Findings** Over 50% of employees are involved in teams
- Non-teams responded to this question with a mean less than 1.0, so they barely agreed with this question.
- On the other hand, Teams responded with a mean at 1.5, so they were in agreement with this question.
Findings

Over 75% of employees are involved in safety teams/improvement ideas
- Non-teams responded in little to no agreement with this question – the results were a mean of less than 0
- Teams responded with a mean of 1.2, fully agreeing with the question.

Findings

There is a common sense of purpose among the employees
- Very similar responses from Teams and Non-teams. They both had a slight agreement with the question, averaging 0.5 responses.
Findings I have written objectives for my own work
- However, Teams responded in agreement to the question, while Non-teams were not as sure, with a mean 0.5 responses.

Findings Key internal and external customers are identified
- Very similar responses from Teams and Non-teams. They both had agreement with the question, with a mean response of 0.9.
Findings There is a written vision statement for day-to-day work at our company
- Non-teams agreed completely with this question, responding with a mean of 1.3
- Teams did not completely agree with this question, responding with a mean of 0.8

Findings There is agreement on the basic human values we consider important to guide our work
- Very similar responses from Teams and Non-teams. They both had a slight agreement with the question, responding with a mean of 0.7.
**Findings** There are written action plans for achieving company objectives

- Very similar responses from Teams and Non-teams. They both had a slight agreement with the question, responding with a mean of 0.8.
- Non-teams agreed more with the question.

**Findings** Employees are organized in a way that best supports achieving the company's core mission

- Neither Teams nor Non-teams agreed completely with this question, since means were less than 1.0
- However, Teams responded in more agreement.
Findings Employees receive adequate training to enable us to reach our objectives
- Very similar responses from Teams and Non-teams. They both had a slight agreement with the question, responding with a mean close to 1.0.
- Teams responded with a higher mean, so were in more agreement.