

**LEAN LONGEVITY: KAIZEN EVENTS AND DETERMINANTS OF  
SUSTAINABLE IMPROVEMENT**

A Dissertation Presented

by

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Submitted to the Graduate School of the  
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**by**

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## **DEDICATION**

To my loving and patient family,

Keith, Mia, and Brady Burch.

To my supportive parents and amazing brother,

Carol and Stanley Kowalski Jr., and Stanley Kowalski III.

## ACKNOWLEDGEMENTS

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## ABSTRACT

### LEAN LONGEVITY: KAIZEN EVENTS AND DETERMINANTS OF SUSTAINABLE IMPROVEMENT

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Typically, a kaizen event occurs when a dedicated cross-functional team is assigned a goal to improve an area in a short period of time using lean production tools. During the last decade, kaizen events have become one of the leading mechanisms by which lean production concepts are implemented. Substantial research has been devoted to aspects of lean production, and yet few empirical studies have been conducted on kaizen events. The factors that lead to the success and sustainability of kaizen event outcomes were investigated in this study.

This dissertation consisted of three stages of research and focused on thirteen kaizen events at eleven organizations. The first stage comprised two qualitative field studies. In the second stage, 133 surveys were administered to 64 team members and 69 non team-members and interviews were conducted with managers and facilitators. The third stage involved follow-up interviews to assess the sustainability of outcomes.

A multi-mode analysis, including qualitative and quantitative analysis, was used to triangulate the data. The hypotheses at both the individual level and organizational



level were tested using bivariate correlational analyses. Managers in this study reported that between 30 and 50 percent of kaizen event improvements backslide. This research found that non team-members' participation in decision-making and communication promoted a climate of continuous improvement and was critical to the success and sustainability of kaizen events. Within this study, large numbers of workers in the targeted areas were not involved in the kaizen event processes. As for the team members, results indicated that they generally had a rewarding experience. However, when the scope of the project was too large, some detrimental effects were noted, such as managerial intervention in the kaizen event process and direct facilitator participation in decision-making. Too much facilitator participation in decision-making was negatively associated with team member-participation in decision-making, attainment of the goal, and a climate of continuous improvement. Finally, it was found that a team with an inappropriate skill set was positively related to a facilitator's level of participation in decision-making, and an organization's level of kaizen event experience was positively related to a climate of continuous improvement.

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## CHAPTER I

### INTRODUCTION

Many organizations hoping to reap the benefits of continuous improvement and lean initiatives have turned to kaizen events. These events, usually lasting anywhere from several days to a week, have been implemented in American organizations with mixed results. Although much has been written regarding lean production, there are very few empirical studies specifically devoted to kaizen events. Based on his research, Veech (2004, p. 1) reported that organizations had trouble sustaining gains within six months of the kaizen events. This study explored the challenges faced by organizations that have implemented kaizen events.

The purpose of this dissertation was to examine factors that contribute to the success and sustainability of kaizen event outcomes using both qualitative and quantitative methods. Subsequent interpretation and analysis emphasized three types of involvement, including participation in decision-making (PDM), communication, and training. Literature from the fields of lean, employee involvement, and participatory management were reviewed.

The research involved three stages. The first stage comprised two qualitative field studies to aid in the development of a survey instrument used in the second stage of research. In the second stage, surveys were administered and interviews were conducted at eleven organizations. In the third stage, follow-up interviews were carried out at the

participating organizations three to six months after completion of the kaizen event to assess the sustainability of performance improvements. Both managers and employees from the targeted process areas were interviewed at that time.

The data was analyzed qualitatively and quantitatively at the individual and organizational level. First, the survey results were presented and the hypotheses tested using correlations analysis. Then, the discussion, which incorporated the interview, observational, and survey data, was organized thematically by relevance and importance as it pertained to this dissertation. Before analyzing the factors that contributed to kaizen event performance, the outcome variables were addressed, including performance gains, goal achievement, success, sustainability, and a climate of continuous improvement (CI). Next, the involvement variables of primary interest (e.g. participation in decision-making, communication, and training) were studied. Structural considerations, organizational climate factors, and management's role, were also explored. Finally, the employees' satisfaction with kaizen events and the necessity of kaizen events were discussed. This dissertation aimed to identify a set of principles and rules for making kaizen events successful and sustainable.

## CHAPTER II

### LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

This literature review encompasses the relatively scant empirical research on kaizen events, the substantial literature on lean production, and presents my dissertation in this context. First, kaizen events are defined and their role in lean initiatives is reviewed. Next, the potential benefits and drawbacks of kaizen events are presented along with factors that have been identified as potentially leading to positive or negative outcomes. In particular, three important variables in kaizen events, including participation in decision-making, communication, and training are explored in greater depth. Previous research on idea systems, a form of employee involvement in some lean organizations, is also reviewed.

#### **Introduction to Kaizen Events**

During kaizen events, also known as “kaizen blitzes”, a temporary cross-functional team develops and implements lean-derived improvements for a targeted process, typically over a three-to-five day period. Reviewing the origin and meaning of the phrase, ‘kaizen blitz’, helps explain the purpose of such an event. The word ‘kaizen’ is a combination of two Japanese words, ‘kai’ meaning to change, and ‘zen’ meaning to improve. ‘Blitz’ has German roots and means to attack suddenly and without warning. Therefore, a kaizen blitz means, “to rapidly take apart and put back in a better way”

(Davidson, Evans, Harmon, Klock, Nekoo, & Yong, 2006). Evidence of the widespread global interest in and significance of kaizen was demonstrated in 1993 when the word “kaizen” was included in the Oxford Dictionary (Sheridan, 1997).

Many books and articles have been devoted to the effect of lean initiatives, but it was not until recently that any research appeared specifically on kaizen events. Some popular works on the topic include Laraia, Moody, and Hall’s book, *The Kaizen Blitz: Accelerating Breakthroughs in Productivity and Performance* (1999), the Productivity Press Development Team’s book, *Kaizen for the Shopfloor* (2002), and Masaaki Imai’s book, *Gemba Kaizen: A Commonsense, Low-cost Approach to Management* (1997). However, peer-reviewed articles on kaizen events are rare and most of the research is based on direct observation and case studies.

### **Significance of This Study**

This study examined the factors that influence the outcomes of kaizen events. This study added to the research not only on kaizen events, but also on lean initiatives, and employee involvement. To my knowledge, there are few empirical studies devoted to kaizen event success factors.

### **Purpose of a Kaizen Event**

The American Production and Inventory Control Society (APICS) Dictionary defines a kaizen event, otherwise known as a kaizen blitz, as “a rapid improvement of a limited process area, for example, a production cell. Part of the improvement team

consists of workers in that area. The objectives are to use innovative thinking to eliminate non-value-added work. Ownership of the improvement by the area work team and the development of the team's problem-solving skills are additional benefits" (Cox & Blackstone, 1998). Kaizen events may also be focused on non-manufacturing processes, such as administrative processes, or simply paper flow.

Metrics used to assess the outcome of a kaizen event often include improvements in process time, required space, resources (i.e., people, machines, material, energy, and information), quality, customer satisfaction, and cash flow (Laraia et al., 1999, p. 36). A kaizen event typically looks for large gains in a focused, small-scope process. As a result, it is necessary to look at performance indicators that address the overall process, so as not to lose sight of the big picture (Laraia et al., 1999, p. 143).

Some organizations have extended their use of kaizen events to their supply chain. For example, Sikorsky Aircraft in 1995 initiated a supplier improvement system that included joint kaizen events at the supplier's site. These events involving teams of employees from both Sikorsky and the supplier were intended to demonstrate the improvement possibilities to the participating supplier. Prior to hosting the event, the supplier had to agree to share any monetary savings with Sikorsky (Foreman & Vargas, 1999). Sikorsky also offered suppliers the opportunity to participate in a "train-the-trainer program" designed to provide information and the tools necessary to conduct kaizen events without Sikorsky's involvement.

## **The Origins of Kaizen Events**

Kaizen events evolved from Toyota consultants' desire to instill Japanese lean philosophies from the Toyota Production System in Toyota suppliers. Taiichi Ohno, the Vice President of Production at Toyota in the late 1980's, was responsible for initiating the program by selecting ten key personnel, known as the Toyota Autonomous Study Group, to drive the effort. Norman Bodek, now a consultant, author, and publisher, offered to help two Toyota based consultants, Yoshiki Iwata and Chihiro Nakao, introduce the lean initiatives in an intense workshop to organizations in the United States. After a few rejections at U.S. organizations, Bodek was able to gain entry into Jake Brake, a Danaher company in Connecticut, thanks to the support of George Koenigsaecker, then the plant manager, and now a world authority on lean. Chihiro Nakao and Yoshiki Iwata, two of the original members of the Toyota Autonomous Study Group, have been credited with introducing kaizen events throughout America after forming their well-known consulting group Shingijutsu (Bodek, 2004, p. 177). In 1994, the Association for Manufacturing Excellence began sponsoring kaizen events in organizations (Laraia et al., 1999, p. ix).

### **The First Kaizen Event**

The first kaizen event at Jake Brake had a five-day format with ten five-person teams. At the time, the event was called 'Five Days and One Night,' because it was intended that the participants would learn and work for five days and get very little sleep (Bodek, 2006). The first day was spent in training as Iwata shared the Toyota Production System philosophies and techniques with the group. On the second day each team



targeted a process to change from linear to cellular production while analyzing cycle times, targeted takt times, and non-value-added and value-added elements. The third day, the groups mapped out the processes, made improvements in the new configuration, and actually implemented the changes on the floor. The fourth day the teams communicated the changes to the employees. The fifth and final day, each group presented what they had learned through the process to the other groups.

### **Lean Production Overview**

Kaizen events use lean techniques to achieve improvements in a short amount of time. Lean production was implemented in many organizations in Japan well before the introduction of kaizen events to the West. In order to fully understand kaizen events, it is necessary to review the history of lean.

Just-in-time production or lean production is typically described as a manufacturing system striving for continuous improvement and the elimination of waste (Crawford & Cox, 1990; Lummus & Duclos-Wilson, 1992; Orth, Hybil, & Korzan, 1990; Suzaki, 1987). Japanese professor Yasuhiro Monden introduced the system developed at Toyota Motor Corporation in his 1983 book, *Toyota Production System: A Practical Approach to Production Management*. Taiichi Ohno and Shigeo Shingo are credited with the development of the lean production system at Toyota (Monden, 1998). But, it wasn't until James Womack and Daniel Jones introduced their book, *The Machine That Changed the World* (Womack & Jones, 1990) that the Western world became truly interested in the philosophy of the Toyota Production System.

## **Origins of Lean**

The origins of the Toyota Production System have been traced back to the period following World War II and the United States' effort to help Japanese industry regain its footing with the introduction of Training Within Industries (TWI) (Robinson & Schroeder, 1993). Masao Nemoto, past president of Toyota, recognized that the Toyota Production System was based heavily upon the TWI program (Robinson & Schroeder, 1993). Training was the backbone of the TWI movement. By using what was referred to as the multiplier effect, U.S. consultants trained Japanese supervisors . . . who then trained Japanese supervisors . . . who then trained Japanese supervisors . . . until the simple, yet effective, system was in widespread use throughout Japan. The key behind the movement was to teach by doing or by example, not just by telling or showing. Three main courses comprised the standardized training program, including Job Instruction Training (JIT), Job Methods Training (JMT), and Job Relations Training (JRT). Job Instruction Training (JIT) focused on training, Job Methods Training (JMT) explored how to make improvements in process and ways to encourage employee ideas, and Job Relations Training (JRT) stressed human relations and leadership (Robinson & Schroeder, 1993).

## **Components of a Lean System**

Yasuhiro Monden broke down the Toyota Production System conceptually into four components: just-in-time, automation, a flexible workforce, and creative thinking or inventive ideas (Monden, 1993, p. 2). The first concept of just-in-time is to produce the right units in the right quantity at the right time. Automation is a quality control

system that does not allow defective units to flow from a preceding operation to a subsequent operation. A flexible workforce means that the number of workers is varied depending on the level of demand. Finally, the last concept of creative thinking or inventive ideas is to problem-solve and collect ideas. Within each of these four concepts, Monden presents methods and tools that support the Toyota Production System.

### **Continuous Improvement - Kaizen**

A key aspect of a successful lean system is a strong continuous improvement program (Motwani, 2003), yet many current books devoted to the topic of lean systems often fail to stress the importance of gathering suggestions and ideas for improvement. “By making continuous incremental improvements in their pursuit of perfection, companies can usually double productivity within two to three years and halve inventories, errors, and lead times” (Womack & Jones, 1996b, p. 158). An idea system is structured to provide a means to continuously improve by collecting ideas and implementing them. Mike Morrison, the Dean of Toyota University in 2003, offered these words about lean thinking:

It’s vastly different from most corporate improvement programs, which are oversimplified, rule-centered, and too conceptual to be effective. In lean thinking, there are *no* “one best ways,” *no* sophisticated management models, and *no* built-in dependencies on outside experts. Instead, lean thinking frees knowledge workers to become independent goal seekers and encourages them to apply their problem-solving skills and critical thinking capabilities to serve customers. (Gonzalez-Molina, 2003)

According to Womack and Jones, continuous improvement is achieved in situations where the workforce is motivated to participate in the lean system (Womack, Jones, & Roos, 1990; Womack & Jones, 1996). Organizations that realize front-line workers are crucial to the success of lean implementation may be one-step ahead of organizations that simply implement the tools associated with JIT production and lean. Although it's believed that adoption of JIT encourages employees to actively look for ways to make their jobs easier and more efficient (Suri & Treville, 1986), concrete, structured initiatives like idea systems may make employee involvement more evident. Kaizen events require employee involvement and therefore may be more likely to achieve sustainable gains if the organization has an effective idea system.

### **Employee Involvement, Lean, and Idea Systems**

Scholars, in an attempt to understand lean production, have identified employee involvement as a critical component. One such study used content analysis to derive three constructs of JIT; operating structure and control, product scheduling, and quality implementation (Davy, White, Merrit, & Gritzmacher, 1992). Of these three constructs, employee involvement or worker input was rooted in both operating structure and control and quality implementation. The JIT philosophy has been cited in the literature for its empowering ability, including its involvement of the worker in decision-making (Banker, Potter, & Schroeder, 1993; Hall, 1987; Johnston, 1989; Schonberger, 1982). “The heart of the system [lean production] is *involvement*: flexible motivated team members continually seeking a better way” (Dennis, 2002). A successful idea system strongly encourages employee involvement.

## **What is an Idea System?**

Idea systems, also known as suggestion systems, are formal, structured organizational systems designed to collect, evaluate, and implement ideas from employees. Given this definition, idea systems do not necessarily have to involve external rewards, such as monetary reimbursements for the quality or quantity of submissions to the program. Idea systems are often discussed in the literature as elements of participative management, gainsharing programs, and employee involvement. A well-implemented idea system can impact an organization along three lean-inspired dimensions: continuous improvement, employee involvement, and organizational learning. First, an effectively implemented lean system often includes a continuous improvement component whereby improvement ideas are expected to come from the bottom up (front-line workers) as opposed to from the top down (management). Idea systems provide the structure to allow these ideas to be heard, evaluated, and acted upon. In addition to continuous improvement, employee involvement, of which an idea system is an example, is often cited as a key component of a lean system. Finally, an idea system may encourage organizational learning opportunities and past research has indicated that learning organizations, as they are described, may be more likely to successfully implement a lean initiative. In conclusion, an idea system may provide the means for promoting continuous improvement, encouraging employee involvement, and fostering organizational learning.

## History of Idea Systems

Idea systems, also known as suggestion systems, date back to 1880 when the first formal system was instituted at the ship yard of William Denny and Brothers in Scotland (Sterne, 1944, p. 13). Some years later, in 1894, the first American companies adopted suggestion systems, and much later in the 1990's would adopt the Japanese version of the suggestion system known as the *kaizen teian* or continuous improvement proposal system (Robinson & Stern, 1997). According to Robinson and Stern, the *kaizen teian* systems, compared to traditional suggestion box systems, more effectively motivate employees to submit ideas (Robinson & Stern, 1997, p. 63). Since their inception, the number of active suggestion systems in America has risen and fallen throughout the years. The effectiveness of the systems is partially dependent on the system's structure, which varies from stationary boxes fixed to the wall to more formal systems designed to promote employee participation. As a result of the overwhelming interest in idea systems, various associations have formed to dedicate resources to the research of such systems, for example the Employee Involvement Association (EIA) in the US, DiB in Germany, and ideasUK (formerly UK Association of Suggestions Schemes) (Beddows, 2001).

Typically, idea systems are instituted with the hopes of either gathering valuable ideas from the frontline workers to improve the overall performance of the organization or, in some instances, organizations hope that the suggestion system will serve as a listening device to help improve worker morale. An organization may adopt a suggestion system hoping to achieve one or both of the benefits as defined. According to a study completed in the UK, the top three reasons for employee participation in an ideas system

were to improve a work process, to improve organizational success, and to save the organization money (Lloyd, 1999).

### **Structure and Processes of an Idea System**

The structure and processes of the idea system has a strong impact on the willingness of employees to participate. A typical suggestion system process begins with the submission of an employee's idea. An evaluation procedure follows whereby an evaluative body of peers or managers assesses whether to accept or reject the idea. At this point, feedback may be provided to the submitter regarding the decision to accept or reject the idea. If the idea is accepted, the idea then follows an implementation process. Some systems include financial rewards, recognition programs, or both.

A company by the name of Boardroom developed an idea system in 1992 that varies from the traditional suggestion system described previously. The system was set in motion when Peter Drucker, a well renowned management consultant, visited Boardroom. Based on Drucker's suggestion, Boardroom's management established a new policy whereby employees were required to bring at least two ideas for improvement to each meeting. After a couple of years, management decided to institute a more rigid policy. If an employee failed to submit at least two ideas on a weekly basis then he or she would not receive the quarterly bonus. Amazingly, as reported in 2004 by Robinson and Schroeder, no one had yet to miss a quarterly bonus as a result of the new strict guidelines (Robinson & Schroeder, 2004).

Several research studies have shown that the structure and processes of the idea system itself can ultimately impact the subsequent level of participation in the program.

Idea systems are often assessed by performance measures such as the quantity and quality of ideas submitted, the number of ideas implemented, and the turnaround time, defined as the time it takes from idea submission to feedback receipt (Savageau, 1996). Implementation and turnaround time, quick feedback, are good indicators of the overall success of the idea system. A case study conducted in Sweden showed that quick feedback was essential to the sustainability of a suggestion system (Rapp & Eklund, 2002). Savageau (1996) observed in another suggestion system long queue times due to an overwhelming number of submissions, resulting in delayed feedback to the submitters.

Campbell, McCloy, Oppler, and Sager, (1993) consider 'making a suggestion' as a specific performance variable of which desirability and feasibility play a key role. When making a suggestion, the feasibility may include factors such as system responsiveness, suggestion inhibitors, and supervisor support (Frese, Teng, & Wijnen, 1999). System responsiveness includes fairness and implementation decisions; whereas suggestion inhibitors are organizational barriers which make it difficult to make suggestions. However, some studies have surprisingly found that system responsiveness did not affect the likelihood of submission (Frese *et al.*, 1999).

In this case, Kim and Mauborgne (2003) found fair process to be a critical determinant of employee trust during their field research involving managers at nineteen organizations. "Managers who believed the company's processes were fair displayed a high level of trust and commitment, which, in turn, engendered active cooperation. Conversely, when managers felt fair process was absent, they hoarded ideas and dragged their feet" (Kim & Mauborgne, 2003, p.131). In fact, if fair process has been displayed,



then the employee, regardless of the desirability of the outcome, will be more likely to “trust and cooperate freely with systems” (Kim & Mauborgne, 2003, p. 131).

Other factors besides timely feedback, system responsiveness, fairness, and financial incentives have been associated with motivation to participate. McGregor (1960) and Katz and Kahn (1966) found that gainsharing programs or Scanlon plans effectively displayed aspects of both participative management and “Theory Y management,” recognizing the desire for personal growth and recognition in the workplace. Some research has shown that organizational climate, including management-employee relations and the level of trust and cooperation may have an impact on the effectiveness of the gainsharing implementation (Bullock & Lawler, 1984; Frost, Wakeley, & Ruh, 1974; Ross & Collins, 1987; Ross, Hatcher, & Ross, 1989; White, 1979). One such study demonstrated that participation in a gainsharing program was dependent on the level of organizational commitment and trust (Hatcher, Ross, & Collins, 1991). Still other research has illustrated that individuals are intrinsically motivated to participate in an idea system because of the desire to reduce organizational obstacles in the process thereby improving the organization (Lloyd, 1999). The aforementioned research has shown that desire for personal growth, the desire for recognition, management-employee relations, level of trust, level of cooperation, level of commitment, and the desire to improve the organization by making the job easier, may all impact the motivation to participate.

When developing models of lean production, researchers often include continuous improvement as a key component. Sanchez and Perez (2001) proposed that there are six principles of lean production including multifunctional teams, elimination of zero-value

activities, production and delivery JIT, supplier integration, continuous improvement and a flexible information system. Within the aforementioned study, continuous improvement was partially measured by the number of suggestions per employee per year, the percentage of implemented suggestions, and savings and/or benefits from the suggestions. Again, this supports the notion that idea systems can be a key aspect of lean production and continuous improvement.

### **Lean Tools**

To delineate all the tools and methods of lean production, as well as the underlying philosophy, is not a straightforward task. According to Michael Lewis, “if no improvement technique is excluded then defining what actually constitutes the lean production process becomes extremely difficult” (Lewis, 2000, p. 963). Often, the list of lean tools is not consistent from one publication to the next. Some examples of the tools typically used in lean organizations are 5S, cellular manufacturing, kanban, SMED (single minute exchange of die), *poka yoke*, pull scheduling, and TPM (total productive maintenance). Adopting the appropriate tools critical to the success of a lean implementation may be a confusing task for an organization, but it appears to be a significant one. Several researchers have found that organizations fail to attain the anticipated benefits of a lean system when only some of the tools in the lean arsenal are implemented (Clode, 1993; Gilbert, 1990; Liker, 2004). It stands to reason that this may be why some organizations do not achieve sustainable gains during kaizen events when an overarching lean philosophy is not adopted.

### **Potential Benefits of Kaizen Events**

After conducting a kaizen event, an organization hopes to achieve any number of organizational improvements. In order to track the progress of a kaizen event it is necessary to have appropriate, easily understood indicators. Often, measures such as saved space, reduction in travel distances, improvement in value-added ratios, reduction in head count, reduction in process duration, set-up time reduction, defect-rate reduction, cost reduction, inventory reduction, and improvement in flow are tracked (Laraia et al., p. 169). The Association for Manufacturing Excellence (AME) reported that kaizen events in targeted organizations have typically resulted in 70 to 90 percent reductions in setup time, 20 to 60 percent improvements in productivity, 40 to 80 percent reductions in process time, 30 to 70 percent reductions in inventory, and 40 to 90 percent reductions in walking distance (Laraia et al., 1999, p. 3).

### **Potential Benefits of Lean Production**

Whereas little has been studied specifically about kaizen events, the benefits of a full lean implementation have been assessed in many different studies ranging from case studies, to descriptive statistics, to survey studies (Ellis & Conlon, 1992; Fullerton & McWatters, 2001; Kagananam & Lindsay, 1998; Ortho et al., 1990; Pandya & Boyd, 1995; Patell, 1987). Some examples of performance measures used in a lean environment are cost, quality, delivery, safety, environmental impact, cycle time, and worker attitudes (Yasin, Small, & Wafa, 1997). Goals of lean production may include improvement of the following: operations efficiency, customer satisfaction, quality, competitive strategic advantage, or management-worker relations (Yasin et al., 1997).

Potential benefits of lean production include quality improvements, improved responsiveness, employee flexibility, accounting simplification, firm profitability, and inventory reductions (Fullerton & McWatters, 2001). Lean production has also been associated with elimination of waste (Tesfay, 1990), improved communication (Inman & Mehra, 1991), cost reduction in purchasing (Ansari & Modarres, 1990), lead time reduction, decreased throughput time, improved quality (Green, Amenkhienan, & Johnson, 1991; Crawford & Cox, 1991; Arogyaswamy & Simmons, 1991), improved level of involvement (Ptak, 1991), and functional integration (Sandwell & Molyneux, 1989; Johansson, 1990; Bhimani & Dromwich, 1991). The most prevalent finding is reduced inventory (Balakrishnan, Linsmeier, & Venkatachalam, 1996; Billesbach, 1991; Billesbach & Hayen, 1994; Celley, Clegg, Smith, & Vonderembse, 1986; Crawford & Cox, 1990; Droge & Germain, 1998; Gilbert, 1990; Huson & Nanda, 1995; Im & Lee, 1989; Norris, Swanson, & Chu, 1994). While some studies have found a significant relationship between lean implementation and improved firm performance (Flynn, Sakakibara, & Schroeder, 1995; Sakakibara, Flynn, Schroeder, & Morris, 1997; Dean & Snell, 1996), other studies have reported discrepant findings (Balakrishnan et al., 1996; Huson & Nanda, 1995; Inman & Mehra, 1993; Mia, 2000). Some research has reported that lean systems can improve a company's competitive position (Billesbach, 1994; Oliver, Delbridge, & Lowe, 1996; Lowe, Delbridge, & Oliver, 1997) and/or reduce instances of worker grievances (Yasin et al., 1997).

### **Possible Drawbacks of Kaizen Events**

Although many organizations reap numerous lean benefits from kaizen events, other organizations fail to report any real improvement. Still others report significant initial gains, but only in the short term. A kaizen event team is dedicated to generating improvements in the targeted area for the duration of the event, but maintaining or sustaining the improvement momentum becomes a problem after the event has ended and the team has dissolved (Kaye & Anderson, 1999; Griffiths, 1998). In fact, many of the improvements slowly revert back to the original pre-kaizen event state (Dale, 1996). David Veech has this to say about his observations and discussions with companies sponsoring kaizen events: “In teaching and listening to leaders in most of these companies, I also hear about the difficulties they face in sustaining those gains. While I haven’t collected any hard data yet, anecdotally these leaders estimate that the gains nearly disappear within six months of the event (Veech, 2004, p. 1).” He did not speculate on why this regression occurs, but some natural questions arise. Were changes made without full knowledge of the reasons for the pre-existing layout or process? Were the workers responsible for the targeted area simply not included in the event and therefore more resistant to the changes? Were there communication breakdowns? Was training inadequate? Perhaps many of the problems could be attributed to the fact that it is such a fast and furious improvement process that much is lost in the way of retention. Perhaps, most of the training was done in a single day and lacked the ‘sticking’ power necessary to maintain the improvements. Perhaps kaizen events cannot survive if there is not an overarching lean system in place to support the changes continuously. Can kaizen events be effective? What is the secret to making a kaizen event successful for the long

term? Some of the answers may already reside in the lean literature, but more research is needed. That is a large part of what this research aimed to explore.

### **Possible Drawbacks of Lean Implementation**

Over the years, academics and practitioners have attempted to capture the true essence of the methods and subsystems in lean production. Organizations around the world have implemented lean production hoping to reap the same benefits that Toyota enjoyed. However, many organizations have implemented continuous improvement initiatives and lean tools without regard to the overall lean philosophy or underlying concepts, and therefore have not realized the purported benefits. Many organizations, looking for a quick fix, hope that implementation of a few of these tools prevalent in lean organizations, such as kaizen events, will reduce costs and throughput time while increasing flexibility. Instead, these quick fixes done in isolation may remedy a problematic situation for only the short term. Womack and Jones contend that a successful implementation of lean production requires more than just implementation of the tools and methods. Successful implementation requires a “lean thinking” philosophy consisting of value, flow, pull, and perfection (Womack & Jones, 1996). Womack and Jones made the following comments with regards to organizations that did not realize the benefits of lean production:

Although many managers had grasped the power of individual lean techniques – quality function deployment for production development, simple pull systems to replace complex computer systems for scheduling, and the creation of work cells for operations ranging from credit checking and order entry in the office to parts fabrication in the plant – they had stumbled when it came to putting them all together into a coherent

business system. That is, they could hit individual notes (and loved how they sounded) but still couldn't play a tune. (1996b, p.140)

It is not a few single initiatives, like kaizen events, but instead a system, the "Toyota Production System", or "lean production" in its entirety, that has produced the amazing results at Toyota. Other researchers agree that successful lean implementation requires adoption of the entire philosophy (Hall, 1987; Heiko, 1989; Im, 1989, White & Ruch, 1990). Other factors that could negatively impact a lean implementation include lack of top management support, lack of training (Vora & Scraph, 1990), lack of an effective logistical planning system, and poor supplier relationships (Landry, 1990; Romero, 1991). Yasin et al. (1997) conducted a field study in 15 organizations and found lean production failures were often attributed to lack of resources, managerial resistance due to fear of power shifts, or managerial reluctance to encourage employee involvement.

### **Negative Perspectives of Lean Implementation**

Although most researchers agree that there are performance benefits to successful implementation of a lean initiative, others have explored the negative impact to the psyche of the workers. Not everything reported about Toyota is positive. Junkerman (1982) cites an example where a Toyota worker took his own life because he was unable to come up with an idea for improvement due to the overwhelming pressure to perform. A Japanese sociologist who worked at Toyota in the 1970's, Satoshi Kamata (1982) described a fast work pace and a difficult work environment with many work-related injuries. Junkerman (1987) interviewed Nissan workers in Japan and reported similar discontent with the excessive speed of work. Helm and Edid (1985) observed Toyota

workers for an extended period and noted eleven-hour days with lunch and two ten-minute breaks. Similarly, workers at U.S. organizations where lean has been implemented reported excessive work paces (Krause, 1986; Junkerman, 1987; Torque & Copeland, 1987; Levin 1985). Based on these accounts, it seems that worker morale may suffer at the cost of improved organizational performance in a lean effort. Despite these negative reports, many organizations adopt lean philosophies knowing that the large majority of organizations that have successfully implemented lean initiatives have realized significant benefits.

### **Improvement Enablers and Inhibitors in Kaizen Events**

Sustainability is not a problem that arises solely within kaizen events; sustainability is a challenge in most change initiatives. A review of other change efforts, such as continuous improvement programs in general, and factors that impact initial success and sustainability, are important to put the problem in a broader context. Drawing on previous continuous improvement self-assessment programs such as the European Business Model of Excellence and the Malcolm Baldrige National Quality Award, Kaye and Anderson (1999) identified ten essential criteria for achieving and sustaining continuous improvement including:

- (1) Senior management commitment and involvement.
- (2) Leadership and active commitment to continuous improvement demonstrated by managers at all levels.
- (3) Focusing on the needs of the customer.
- (4) Integrating continuous improvement activities into the strategic goals across the whole organization, across boundaries and at all levels.



- (5) Establishing a culture for continuous improvement and encouraging high involvement innovation.
- (6) Focusing on people.
- (7) Focusing on critical processes.
- (8) Standardizing achievements in a documented quality management system.
- (9) Establishing measurement and feedback systems.
- (10) Learning from continuous improvement results, the automatic capturing and sharing of learning (Kaye & Anderson, 1999, p. 489)

Many of these criteria overlap with other research findings and all ten could apply to lean initiatives and kaizen events.

The literature on process improvement is relevant when studying kaizen events as well. Bateman and Rich (2003) conducted a qualitative study exploring the factors that enable and inhibit process improvement. Most organizations identified inhibitors with relative ease, but when it came to enablers they typically referred to general cultural issues, which the researchers concluded was because they truly did not know how to identify specific enablers to change the culture. Some of the inhibitors were identified as lack of resources, lack of focus due to other business pressures, failing to communicate the need for change, and lack of managerial support. Compared to the ten essential criteria as defined by Kaye and Anderson (1999), the study by Bateman and Rich (2003) also included lack of resources and failure to communicate the need for change as additional inhibitors.

### **Employee Involvement and Communication**

Who should be involved in the kaizen event and in what capacity? According to Shadur, Kienzle, and Rodwell (1999), the construct of employee involvement can be

broken down into a combination of participation in decision-making, teamwork, and communication. Lawler (1996) stressed the importance of communication and information flow within employee involvement initiatives. Bowen and Lawler (1992) defined the three types of involvement as suggestion involvement (suggestions programs), job involvement (teams), and high involvement. “Leadership and trust in leadership is instrumental, realizing that the benefits can be best realized in a situation where the kaizen is embraced for its learning potential” (Laraia et al., 1999, p. 242). Eccles (1993), in his review of involvement literature, likened suggestion involvement to the Japanese ‘kaizen’. “Beyond the specific improvement needs they fill, employees’ kaizen experiences are intended to teach problem-solving and a way of thinking about production; a good kaizen event creates a path for more worker involvement, for real participation in the business. From suggestion systems to redesigning product and process flows to redefining their own jobs” (Laraia et al., p. 241).

### **Participation in Decision-making**

Stohl and Cheney (2001) offer the following comprehensive definition of participative management:

Worker participation comprises organizational structures and processes designed to empower and enable employees to identify with organizational goals and to collaborate as control agents in activities that exceed minimum coordination efforts normally expected at work (Stohl & Cheney, 1996). These activities may include (a) decision-making and broad inclusion at the shop-floor level (e.g. ad hoc problem-solving teams), (b) involvement in decisions and actions traditionally under the purview of management such as hiring and firing (e.g., semiautonomous work teams), and (c) representative voice in conversations and strategic decisions at the corporate or industry-wide level (e.g., works councils or governing councils). More generally, a culture of participation exists

wherein at least some efforts are made at democratizing the processes of work, although motives for and degrees of this are highly variable across organizations. (p. 357)

Within participatory management, as discussed in Stohl and Cheney's definition, idea systems would be considered a form of participation because they involve shop-floor level employees in problem-solving activities. Suggestion systems, job enrichment or redesign, and survey feedback are examples of initiatives that may be instituted as a part of a participative management program (Drehmer & Coye, 2000, p. 398). According to this definition, it is plausible that idea systems can bring an organization one step closer to achieving a participative culture. The research devoted to participative management reported discrepant findings at best. Scholars attempted to shed further light on the efficacy of such programs by reviewing the past research, but still did not reach a consensus (Cotton, Froggatt, Lengnick-Hall, & Jennings, 1988; Leana & Florkowski, 1990; Locke & Schweiger, 1979; Miller & Monge, 1986; Wagner & Goodings, 1987). Much of the debate revolves around the definition and the breadth of participative management. That is, how broadly should the topic be defined and what programs should be included as aspects of participative management?

### **Employee Involvement**

In 1986, Lawler introduced 'employee involvement' as a process-focused approach to participation. Marchington, Wilkinson, Ackers, and Goodman (1994) contend that employee involvement includes those programs intended to increase information flow to provide employees the chance to make work decisions. House

journals and employee reports, team briefings, suggestion schemes, attitude surveys, quality circles, customer care/total quality management, profit-sharing schemes, joint consultative committees, and work councils would all fall under the umbrella of employee involvement based on this definition (Marchington et al., 1994). Work teams and job enrichment have also been cited as examples of employee involvement (Bounds, Yorks, Adams, & Ranney, 1994). Lawler (1988) believes that there are levels or degrees of employee involvement. Clearly, an effective suggestion system or idea system has the potential to promote employee involvement.

### **Benefits of Participation in Decision-Making**

One study showed that the impact of negative outcomes on attitudinal variables, such as the intent-to-stay, and trust-in-supervisor, is lessened if the employee participates in decision-making (Magner, Welker, & Johnson, 1996). In other words, the interaction between participation and outcome favorability has been of interest. This phenomenon has not been studied in the context of a kaizen event. In other words, negative outcomes such as more quality problems and difficulty of moves will have a less negative effect on intent-to-stay and trust-in-supervisor if employees participate in the decision-making than when they do not participate. Besides the fact that participation by the front-line workers could potentially improve kaizen event outcomes, it stands to reason that employee participation would result in a positive change in attitudinal variables and a smoother transition during implementation of proposed changes, marked by greater acceptance.

## **Organizational Learning**

Idea systems, or suggestion systems, have been compared to organizational systems from an organizational learning perspective (Arthur & Smith, 2001). In order to provide an explanation of organizational learning, it would be advantageous to refer to the work of Argyis and Schon (1978, 1996), who developed one of the most predominant models in the area. Within their framework employees perceive a gap between what exists and what is expected that in turn prompts employees to bridge the gap in one of two ways. The first-order process (Hedberg, Nystrom, & Starbuck, 1976) relies on the use of familiar existing, incremental, processes; whereas a second-order process stems from a new set of rules or patterns. Several academics have alleged that a lean organization must also strive to become a learning organization if it is to be successful (West & Burnes, 2000). Garvin (1993, p. 80) defines a learning organization as “an organization skilled at creating, acquiring and transferring knowledge, and at modifying its behavior to reflect new knowledge and insights.” Scholars have previously identified systematic problem-solving as an example of an activity undertaken by a learning organization (Garvin, 1993; Hirschorn & Gilmore, 1992; Nonaka, 1991; Senge, 1991). Idea systems not only promote problem-solving, but also potentially provide a means for disseminating knowledge in the form of submitted ideas.

## **Organizational Outcomes of Idea Systems**

Researchers have attempted to analyze the impact of participation programs and employee involvement programs, but it is difficult to measure the effects of a single program because a vast number of initiatives are often implemented concurrently. Cotton

et al. (1988) found that participation in decision-making, informal participation, and ownership were linked to positive effects, while participation in short term endeavors was not associated with positive effects. Wagner (1994) found no connections between type of participation and organizational outcomes.

Some researchers contend that individual suggestions are more effective than group or team contributions to an improvement effort because it is more difficult for teams to develop ideas while continuing with other work responsibilities, the teams must deal with communication issues and other team issues, and there will be a reluctance to submit counter-intuitive suggestions in a group setting (Schuring & Luijten, 2001, p. 360). Savageau noted that team-based initiatives are usually very focused on process control and improvement, whereas idea systems tend to have a much broader focus (Savageau, 1996).

### **Improved Productivity and Job Satisfaction**

An employee involvement program has been shown to improve an organization's overall financial performance (Katz, Kochan, & Weber, 1985; Rosenberg & Rosenstein, 1980). Research on gainsharing programs also supports the idea that participation in gainsharing plans is associated with improved performance measures (Gowen & Jennings, 1990; Rosenberg & Rosenstein, 1980). In addition to productivity outcomes, research has demonstrated that participative decision-making improves job satisfaction (Cotton et al., 1988; Miller & Monge, 1986).

However, there are some who have found conflicting results and are not convinced that employee participation programs result in positive organizational

outcomes (Locke & Schweiger, 1979; Schweiger & Leana, 1986; Wagner, 1994). Cotton et al. (1988) concluded that the positive effects of participation depend largely on the form of participation. Cotton et al. found that participation in work decisions (permanent programs), informal participation, and employee ownership (employees own the firm) impact performance positively, while informal participation and representative participation (elected front-line representation) improve employee satisfaction.

### **Idea Systems, Lean, and Change**

Idea systems offer other possible advantages to a lean system. When instituting a management system, such as lean production, it is important to obtain employee buy-in. An employee of Lockheed Martin, an organization that successfully implemented a new management system, asked, “Who knows how to organize it better than the people that are actually doing it?”(McClenahan, 2003, p. 64) An idea system can be used during the formative stages of lean implementation to give the employees a voice throughout the lean initiative. During the early stages of lean implementation it is also necessary to align employee objectives with organizational objectives (Schuler & Jackson, 1987; Kerr & Jackofsky, 1989). An idea system can be structured such that the collected suggestions are focused around a particular organizational objective.

Schwochau et al. (1997) found that formal participation programs are positively related to employees’ willingness to accept change in organizational policies. It stands to reason that if idea systems, a form of participation, were instituted prior to a lean implementation, it could diminish the employee reluctance to change and facilitate the lean effort. If the system were not already in place prior to a lean implementation, it

would certainly behoove an organization to make sure there was a strong, uncomplicated, responsive idea system in place to serve as an information tool and to enhance communication during the lean initiative.

### **Other Potential Benefits**

Besides improved job satisfaction and productivity, there potentially exist other benefits to employee involvement programs, such as improved employee-employer relations and less resistance to change (Leana & Florkowski, 1992). If participation programs truly result in less resistance to change then it would stand to reason that instituting the program prior to implementation of a change program, such as a lean initiative would make the ride a bit smoother. The human resources approach to participation includes the affective model which contends that participation leads to employee attainment of higher-order needs that results in increased satisfaction and decreased resistance to change (Miller & Monge, 1986). The motivational model suggests that participation increases employee commitment and trust while diminishing resistance to change. Consequently, the employees are motivated to work harder, thereby improving productivity (Locke & Schweiger, 1979).

Finally, the cognitive model suggests improved productivity and employee satisfaction based on the notion that improved information flow, both top-down and bottom-up, gives employees the ability to make informed decisions, while allowing upper management to reap the benefits of the information held uniquely by front-line workers (employee creativity) (Cooke, 1990, 1992; Leana & Florkowski, 1992; Levine & Tyson, 1990; Miller & Monge, 1986). This finding seems to concur with the research that has



found improved communication perceptions as a result of the participative environment (Hanlon & Taylor, 1991; Hanlon, Meyer, & Taylor, 1994; Marks, Mirvis, Hacket, & Grady, 1986). Many environmental variables that impact the benefits of participation remain to be investigated and debated by researchers, such as organizational size, extrinsic rewards, industrial size, union/non-union, job type, and the structure of the participation program.

### **Referent Cognitions Theory**

The referent cognitions theory (RCT) (Folger, 1986), having roots in organizational justice, can be applied in the context of kaizen events. Referent cognitions theory contends that negative attitudes and resentment are greatest when a person believes that outcomes would have been better if the decision maker had used alternate decision-making procedures. McFarlin and Sweeney (1992) and Brockner, Konovsky, Cooper-Schneider, Folger, Martin, and Bies. (1994) further argued that if there is a belief that fairer procedures were not used than negative attitudes result from the gap between the referent outcome and the actual outcome. During a kaizen event, procedures, including employee involvement, communication, and training, could impact both performance-related and attitudinal outcomes. If employees believe that there were alternate kaizen event procedures that would have resulted in more favorable outcomes, then employees would have reacted negatively. A fair decision-making process is one that includes voice (Folger, 1977), or the chance to give an opinion before the final decision is made. Kaizen events directly impact future task assignments of frontline workers. If the worker is not given the chance to express his or her opinions during the

kaizen event, chances are that there will be a decreased morale as posited in the referent cognitions theory. Research has shown that voice is a fundamental norm of entitlement in task assignment (Early & Lind, 1987). Cropanzano and Folger (1989) say that “the absence of participation makes it easier for people to imagine ways their outcomes might have been more favorable” (p. 298). Procedural fairness has been operationalized as communicating decisions prior to the outcome (e.g., Brockner et al., 1994) and as communicating reasons for decision outcome (e.g. Folger & Martin, 1986), and as participation (Magner, Welken, & Johnson, 1996).

### **Social Exchange Theory and the Norm of Reciprocity**

Social exchange theory and the norm of reciprocity (Blau, 1964; Homans, 1961) offer possible explanations for the relationship between kaizen events and the longevity of outcomes from such events. Eisenberger, Huntington, Hutchinson, and Sowa (1986) proposed that social exchange theory and the norm of reciprocity pertain to an employee’s relationship to the organization as well. Based on the policies and procedures used within the organization, the employees develop perceptions about the organization’s attitude toward them (Levinson, 1965). If the workers perceive that the organization supports them and is committed to making the workplace a better place, then the workers are more likely to reciprocate with their own commitment and dedication to the organization (Whitener, 2001). In this context, the organization can display its support for its employees by keeping the workers involved during the kaizen events, especially the members of the organization that will be directly impacted by the changes. This involvement includes training, communication, and participation in decision-making. By

making the worker feel appreciated and valued, the worker in turn may be more likely to reciprocate by accepting the proposed changes and implementing them to the best of his or her ability. The worker may also be more likely to maintain these changes over time while looking for other improvement opportunities. Some research relying on social exchange theory suggests that employee's organizational commitment is dependent on the perception of the employer's commitment to the employee (Eisenberger, Fasolo & Davis-LaMastro, 1990; Settoon, Bennett & Liden, 1996; Wayne, Shore & Liden, 1997). Some research has found that organizational practices are reflections of an organization's commitment to the employee (Settoon et al., 1996; Wayne et al., 1997).

### **Training**

In order to sustain the improvements and avoid worker resentment resulting from kaizen events, some researchers have stressed the importance of training and scheduling (Laraia et al., 1999). "The aim of initial projects, after all, is to encourage the organization to further action by achieving quick, highly visible, and sustainable success. How better to bring this about than by employing a few simple tools that people are familiar and comfortable with" (Laraia et al., 1999, p. 173)." Laraia et al. recommended the following in their book, *The Kaizen Blitz: Accelerating Breakthroughs in Productivity and Performance* (1999), to sustain improvement from a kaizen event:

- Make standardization and daily production schedule forms, created by employees to encourage ownership, highly visible to the workers in order to continue improvement efforts.

- Establish discipline through standardization that will inevitably help establish guidelines, thus avoiding relapse to the before state (Laraia et al., 1999, p. 232).
- Make it simple and demonstrate the new method as more simple. *Poka yokes* can be helpful here.
- A four-hour education and training session on TPS, takt time, one-piece flow, and pull-systems should be given to key individuals from the targeted process that will be supporting the team's efforts (Laraia et al., 1999, p. 103). This same type of informative training session should be given to the team a couple days prior to the kick-off. Training and education is a value-added activity in that it improves the human assets ability allowing for greater improvements during a kaizen event (Laraia et al., 1999, p. 151).

If little emphasis is placed on training and communication with individuals whose stations will be transformed, there is likely to be a decreased willingness to accept the imposed changes (Productivity Press Development Team, 2002). Training, before, during, and after a kaizen event would appear to be key ingredients to achieving sustainable gains.

## Other Improvement Enablers and Inhibitors

### Job Security

In the 1980's there was often a fear of losing one's job associated with implementing kaizen due to the need for less manpower as a result of improvements (Sayer, 1986). In Japan, however, workers typically felt secure in their jobs and felt free to make suggestions for improvement (Johnson, 1988). Studies have shown that job insecurity is negatively related to job satisfaction and commitment (Ashford, Lee & Bobko 1989; Steers 1977; Forbes 1985; Oldham & Cummings, 1986). Past research demonstrated that job insecurity results in lower participation rates in employee involvement initiatives (Levine, 1995; Lawler, Ledford, & Mohrman 1989; Kochan, McKersie, & Katz 1985; Bluestone & Bluestone 1992; Pfeffer 1998). Levine (1995) contended that ensuring worker job security is critical in order to encourage worker input for improvement without the fear of layoffs. Osterman (2000) found a direct relationship between employee involvement initiatives and likelihood of layoffs. Preuss and Lautsch (2002) concluded that "the effect of EI on satisfaction and commitment seems separate to a great extent from security-related practices and perceptions" (p. 528). In other words, it seems that formal job security it seems is not necessary for employee involvement initiatives to be successful. These findings are contrary to the previous studies identifying the negative ramifications of job insecurity on involvement initiatives. "This suggests that EI has not only direct positive effects on job satisfaction and commitment . . . but it also indirectly improves worker attitudes through its influence on employee perceptions of managements' informal security efforts" (Preuss & Lautsch, 2002, p. 530). The transferability of Japanese lean systems to the U.S. was often been questioned in the

literature in the late 80's and early 90's (Klein, 1989; Young, 1992; Zipkin, 1991) largely due to the differences in culture and job security.

### **Organizational Climate**

According to researchers from the Association for Manufacturing Excellence, the most critical element to sustaining improvement is culture change (Laraia et al., 1999, p. 226). First, it is necessary to prepare the organization for change. A kaizen blitz in itself prepares an organization for change by allowing suggestions to be made while the organization is listening. The second element gives employees the skills necessary to make improvements in their everyday jobs, often accompanied by personnel changes and managerial responsibilities (more coaching) which are often difficult to accept (Laraia et al., 1999, p. 230).

Masaaki Imai, a consultant who founded the Kaizen Institute, a consulting firm, had this to say about the sustainability of kaizen results:

“You have to change the mentality of both operators and managers. And you also need to develop many supporting systems . . . . You can change the way people do their jobs, but if you don't develop your internal systems to ensure the continuity, then after a week or so, people will be doing their jobs the same way they did them before” (Sheridan, 1997). Imai has written two influential books on lean, including *Kaizen: The Key to Japan's Competitive Success* (1986) and *Gemba Kaizen: The Common-Sense Approach to Business Management* (1987). Gemba means the workplace - the place where real action takes place.

The Productivity Development Team (2002) stressed that in order for a kaizen event to thrive, the environment must be one committed to lean endeavors in order for improvements to ‘stick’ and have a culture of continuous improvement. This research further examined the impact of organizational climate on the effectiveness of a kaizen event. I theorized that a more involved environment may result in a wider acceptance of the changes and if proper involvement techniques are followed during the kaizen event, including training and communication, the changes may be more readily accepted and people may be more likely to want to participate in another event, thus changing the involvement climate.

### **Top Management Support and Responsibilities**

Laraia et al. in their book, *The Kaizen Blitz: Accelerating Breakthroughs in Productivity and Performance* propose four ways that managers can demonstrate commitment to a kaizen event:

1. Consistent vision. Answer the questions; “What are Kaizen Blitzes supposed to be implementing, and why?”
2. Sustain human development. Create an environment for human development, including incentives for it.
3. Provide the resources. Provide the budget (relatively modest and human time (more generous), and assure technical support of the processes.
4. Set priorities. Everything can’t be done at once. (Laraia et al., 1999, p. 35)

In addition to these four recommendations to managers, Laraia et al. (1999) suggest the following to sustain gains from a kaizen event:

- An organization must have an overall long-term strategy of improvement and use kaizen as just one means to achieving the overarching goals of the organization. For example, Wiremold reportedly spent the first six months running kaizen events with little to no sustained benefits due to the lack of human change (Laraia et al., 1999, p. 224).
- The researchers from the AME suggest that multiple narrowly focused kaizen events be planned in a sequence that best encourages flow throughout a process in an organization (Laraia et al., 1999, p. 225).
- Commitment from all ranks of the organization, particularly upper management, is essential for continued success from kaizen events.
- Use kaizen events as a means to introduce employees to a culture of involvement, improvement, and lean.
- When selecting a first-time kaizen project, chose a repeatable process that has high exposure across the organization and so can serve as a confidence builder (Laraia et al., 1999, p. 97).

In order to maintain the gains, it is necessary to combine kaizen events with long-term goals and management focus. Jeffrey Liker warns that, “. . . the *kaizen* workshop should not become an end in itself. In many companies, ‘lean efforts’ revolve around having numerous workshops: the more the better. This leads to “point *kaizen*”—fixing individual problems without straightening out the core value stream. *Kaizen* workshops are best used as one tool to implement specific improvements guided by a future state value stream map” (Liker, 2004, p. 304).



## **Structural Considerations**

According to Laraia et al. (1999), the expertise and effectiveness of a facilitator is often cited as one of the more critical determinants of success along with education, training, and experience. The facilitator, the person responsible for running the kaizen event, should be an experienced, highly competent leader. In addition, this team of researchers believes that the supervisor in the targeted area should act as the team leader, a separate role from that of the facilitator, and be responsible for encouraging idea generation. As a last point regarding the structure of the kaizen event, Laraia et al. (1999) recommend that the team composition be a core of individuals working directly in the targeted area. They further suggest that if the employees are given the opportunity to volunteer their efforts in the kaizen event it will build trust (Laraia et al., 1999, p. 102).

## **Role of Supervisors**

Research has shown that top-level and middle-level management support is important to the success of an employee involvement initiative (Tesluk & Mathieu, 1999). Typically, upper-level managers are responsible for adopting and developing employee involvement practices, but it is the middle managers that are generally responsible for implementing the programs (Klein, 1984; Middlebrooks, 1991). Although these managers often recognize the benefits of employee involvement, they also may be reluctant to implement them based on job security concerns and additional work requirements (Fisher, 1986; Walton & Schlesinger, 1979). In the context of kaizen systems, research shows that the manager may also feel disempowered if not given the authority to assess the idea (Savageau, 1996). To make matters worse, the manager may

feel slighted because of the directive passed down to implement the idea (Savageau, 1996). Savageau contends that not making managers accountable for employee involvement results further jeopardizes a program's effectiveness (Savageau, 1996). Most research to date contends that supervisor support is critical to the success of idea systems (Amabile, Conty, Coon, Lazenby, & Herron, 1996; Oldham & Cummings, 1996; Scott & Bruce, 1994).

## **Lessons Learned**

### **Failure of Quality Circles**

Although the use of quality circles has waned over the last couple of decades, the lessons learned from their failure may provide insight into questions about kaizen event success. Quality circles are teams of individuals with similar backgrounds that met on a regular basis to make improvements. Both quality circles and kaizen event teams make organizational improvements based on participant recommendations. However, kaizen teams usually focus all their efforts on the kaizen event and disband after the initial event during the short period of time; whereas quality circles meet regularly in addition to other duties. The teachings on quality by W. Edward Demings and Joseph Juran led to the adoption of quality circles in Toyota (Laraia et al., 1999, p. 31). It has been argued that quality circles failed in the United States because they were typically implemented in isolation; whereas in Japan, there was an entire system in place, namely total quality management (TQM). Ishikawa (1985) predicted failure for American adoption of quality circles because he believed that top management should adopt total quality management concurrently. The main objective of total quality management was to change the culture.

According to Ambler and Overholt (1982), fifty percent of quality circles in the United States failed in the early 1980s. Bradley and Hill (1983; 1987) researched British and American organizations and found that the quality circles did not result in greater communications, trust, or involvement. Studies identified a lack of cooperation among middle managers and supervisors in quality circles (Wells, 1982).

### **Lessons Learned at Jake Brake**

After implementing changes from kaizen events at Jake Brake, the site of the first kaizen events in the late 1980's, Jake Brake's employees struggled over the course of the next three months as problems surfaced within the new system. However, the organization was able to remedy the problems and show marked improvement. Norman Bodek, a consultant and participant in the first kaizen events at Jake Brake, believes if the workers had been informed about the upcoming kaizen events and given assurances that training would be provided the transition would have been smoother ("The birth of the kaizen blitz," n.d.). Bodek recognized that the employees had a difficult time absorbing the changes because they were not included in the initial training and were not educated and informed about the changes that were to come. He commented that probably the most difficult change was that they would have to stand while performing multiple tasks in a cell (Bodek, 2004, p. 108). Although, Jake Brake encountered some problems in the three months following the kaizen events, the organization was eventually able to regain footing and benefit from the gains. Why was Jake Brake able to capitalize on the lean benefits of the kaizen events over the long term? Perhaps, the fact that a team of five lean implementers remained at the facility to sustain improvements and continue with

lean initiatives contributed to the success at Jake Brake. Or perhaps it was the multiple concurrent kaizen events carefully selected with the overall lean goal in mind that contributed to the success.

### **Cornell Students' Participation in a Kaizen Event**

In 2002 and 2003, Cornell MBA students were invited to participate in a kaizen event at the Lord Corporation. The students concluded that the following factors contribute to a successful kaizen event:

- The use of lean tools that are easy, rather than complex and difficult, to understand
- A team leader who is familiar with the lean tool implemented
- At least one employee on the team who works in the targeted area. (The students cited an example where the second shift employees returned to work and undid all the changes that were instituted. No one had communicated to the second shift employees that there was going to be a kaizen event.)
- Careful selection of projects that are doable in the kaizen event time frame
- An effective facilitator
- Clear goals
- The availability of current metrics and procedures

Lord Corporation's employees also compiled a list of success factors. Those factors not already addressed by the Cornell students included:

- Performance goal increases of at least 50%
- A team composition of members both familiar and unfamiliar with the targeted area
- Data collection prior to the event kick-off
- Identification of future improvements following the event
- Appointment of a committee to approve the lean tools used in the event (Bradley & Willet, 2004).

### **Kaizen Event Success Factors Compiled at an AME Conference**

At an event in 2000 sponsored by the Association for Manufacturing Excellence (AME), called “Improving Your Kaizen Process”, participants compiled the following steps to a successful kaizen event:

- Draft a team mandate or charter including purpose, boundaries, scope, and objective
- Communicate the draft mandate to all stakeholders
- Select a team leader
- Finalize the mandate
- Schedule the kaizen project
- Select educational materials
- Schedule managers and executives to be at report meetings
- Schedule facilities and equipment for the project

- Reserve support resources internally and from suppliers as needed to implement changes
- Review the project mandate and team composition with stakeholders, including workers
- Educate and train kaizen team members so they can decide what changes to implement
- Educate and train all affected and contributing associates about the principal and best practices (all stakeholders including workers not on the kaizen team)
- Determine baselines (starting points) for the team and subteams and reports
- Brainstorm (team and subteams and reports)
- Publish brainstorming lists and invite and obtain suggestions from those not on the team
- The team develops a kaizen newsletter (planned action list)
- Publish the kaizen newsletter and invite and obtain suggestions from those not on the team
- Team presents key planned actions to all affected and contributing associates, and invites and obtains suggestions from those not on the team
- Resolve the team progress report with objectives, starting points, and the team's projected results
- Publish the progress report
- Implement improvements and report
- Do trial runs with changes and report
- Plan refinements and report

- Implement refinements and report
- Management report meeting and celebration at the end of the event
- Follow - through after the event and reports
- Present a final management report (completed changes)
- Celebrate and disband the kaizen team (Tonkin, 2000)

## **Derivation of Hypotheses**

Based on the theory and past research considered in the literature review and a proposed model of a kaizen event (see Figure 1) hypotheses have been derived. The following hypotheses have been derived at the organizational level:

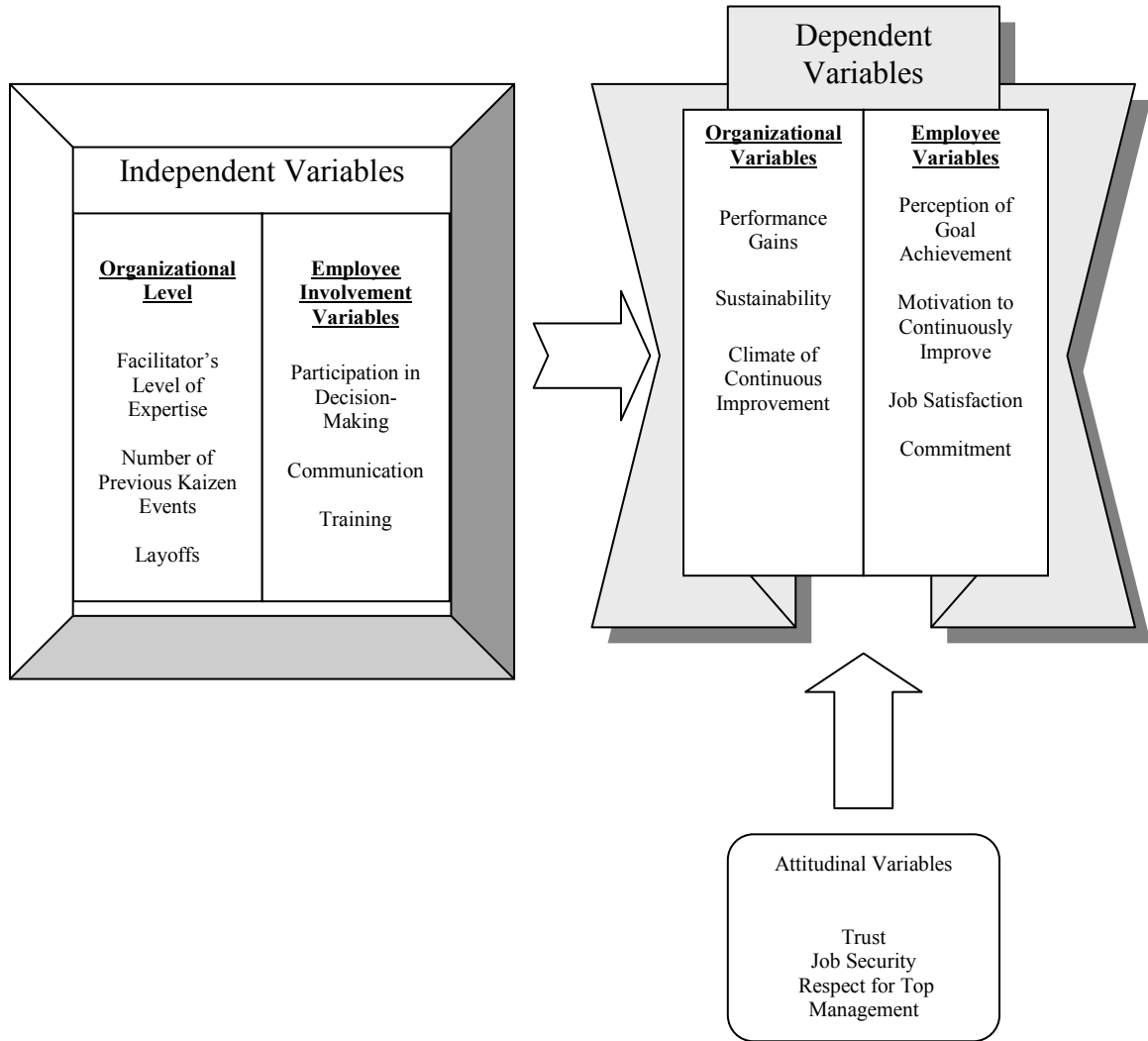
- H1: Participation in decision-making, communication, and training will be positively related to kaizen event performance gains, sustainability, and a climate of continuous improvement.
- H2: The facilitator's level of expertise will be positively related to performance gains.
- H3: Layoffs and turnover will be negatively related to kaizen event performance gains, sustainability, and a climate of continuous improvement.
- H4: The number of previous kaizen events will be positively related to performance gains, sustainability, and a climate of continuous improvement.

The following hypotheses have been derived at the individual level:

- H5: The employee's perception of participation in decision-making, communication, and training will be positively related to the employee's perception of goal achievement and a general motivation to continuously improve.
- H6: The employee's perception of participation in decision-making, communication, and training will be positively related to job satisfaction and commitment.
- H7: Trust, job security, and respect for top management will be positively related to the employee's perception of goal achievement and a general motivation to continuously improve.



**Figure 1. Kaizen Event Variables of Interest**



## CHAPTER III

### RESEARCH METHODOLOGY

The first stage of this research consisted of two exploratory field studies, which were primarily qualitative in nature. Preliminary findings from these field studies were used to develop a survey instrument administered in the next stage of the research. This second stage included interviews at eleven organizations with a key member of management and the kaizen event facilitator. At the conclusion of each of the kaizen events, surveys were administered to kaizen event team members and the employees, who were not team members, directly impacted by the resulting changes. The third and final stage of the research involved follow-up interviews three to six months after the kaizen event at each of the eleven organizations with a member of management and several employees directly impacted by the changes. Once the data was collected, interviews and surveys were analyzed qualitatively. In addition, correlations analysis was employed to analyze the survey data. The gathered data was analyzed both qualitatively and quantitatively to discover a set of principles and rules for making kaizen events a success and factors that contribute to failure.

#### Research Stages

##### **Stage One: Preliminary Qualitative Field Studies**

The first stage of the research comprised two qualitative field studies designed to explore the issues of participation in decision-making, communication, and training

during a kaizen event, along with any other unforeseen variables of interest. Two organizations located in Western Massachusetts participated in this preliminary exploratory research. An initial interview was conducted with a member of management to gather organizational data from each of the two participating organizations. The questions intended for the member of management are listed in Appendix A. The researcher was invited to participate as a kaizen team-member for the first event. Daily interviews were conducted at both kaizen events during Stage One. These interviews consisted of open-ended questions with the facilitator of the kaizen event, team members, and employees from the targeted area. Examples of questions asked during these interviews are listed in Appendix A. Any pertinent supporting documents were collected whenever possible. Following the event, each facilitator was interviewed to discuss structural, involvement, and performance outcome questions. A list of sample questions is given in Appendix A.

### **Stage Two: Interviews and Surveys at Eleven Organizations**

During stage two, the primary data for the research was collected through surveys and interviews at eleven different organizations during eleven different kaizen events. A member of management was interviewed at each of eleven companies to collect organizational information prior to each kaizen event. A list of interview questions intended for a key member of management is given in Appendix A.

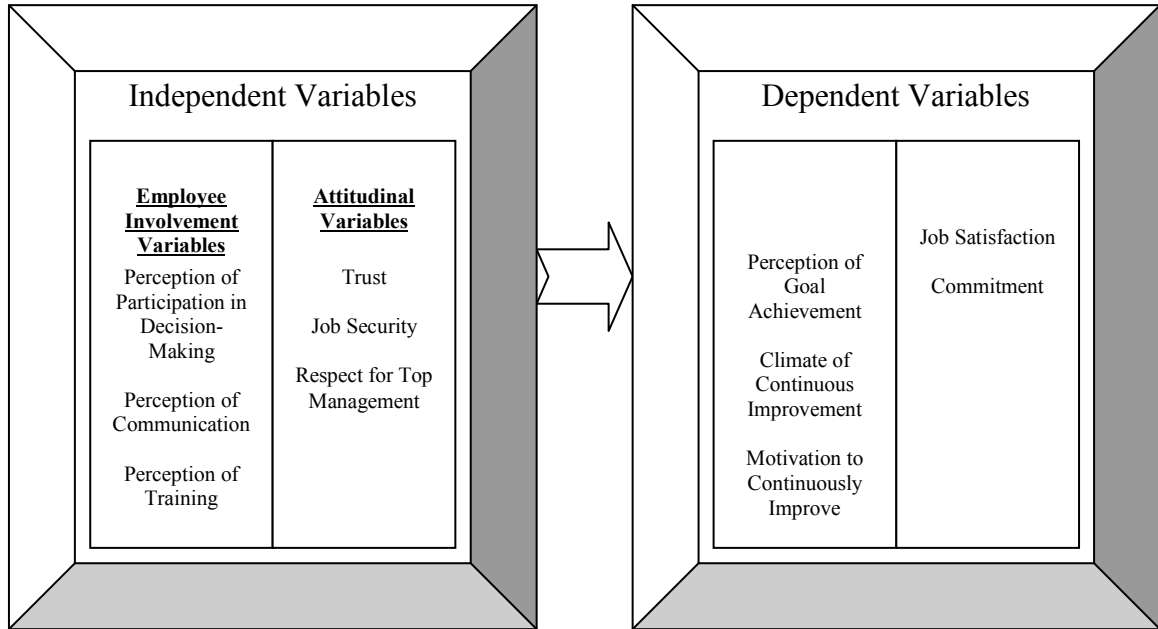
Following each event, the facilitator of that event was interviewed to collect data regarding the structure, procedures, and performance outcomes of the kaizen event. A

sample list of questions that were directed to the kaizen event facilitator is given in Appendix A.

Surveys were administered at eleven organizations to a total of 133 employees following each kaizen event. The team-member surveys were administered following the report out and the non team-member surveys were given to a member of management with a self-addressed envelope to administer in a timely fashion. With just a few exceptions, these surveys were completed within days of the completion of the kaizen event.

As shown in Figure 2, the surveys addressed three components of involvement, including the employee's perception of participation in decision-making, the employee's perception of communication, and the employee's perception of training. The survey instrument also assessed attitudinal variables, including trust, job security, respect for top management, job satisfaction, and commitment. Finally, the employee's perception of goal achievement, the employee's perception of a climate of continuous improvement, and the employee's motivation to continuously improve were assessed.

**Figure 2. Kaizen Event Survey and the Variables of Interest**



### **Stage Three: Follow-up**

In the third stage of the research, follow-up interviews were conducted between three and six months after the completion of the kaizen event at each of the eleven organizations. These interviews assessed the sustainability of improvements resulting from the kaizen event. An interview was conducted with a member of management at each organization and a few employees from the area impacted by the changes resulting from the kaizen event. A list of possible questions for the manager and the impacted employees are detailed in Appendix A.

## **Survey Development**

Survey participants were asked to indicate their degree of agreement or disagreement to each item using a five-point Likert scale ranging from strongly agree to strongly disagree. The instrument included some negatively worded items to avoid response sets where participants would respond to a series of items in the same direction without concern for the content. The measures used were either developed specifically for this study or were adopted from the existing literature. The measures for the attitudinal variables were drawn from the literature.

## **The Pre-Test**

Both surveys were pre-tested during the preliminary research conducted in Stage One at two different organizations. The team member survey was administered to nine individuals and the non team-member survey was completed by five employees. In addition, the team member survey and non team-member survey were administered to five acquaintances of the researcher. The clarity of the questions was discussed with respondents and slight modifications were made to the wording of some items.

## **Survey Measures**

Two surveys were developed with slightly different items to account for the different experiences by team members and non team-members. The organizational level measures are presented first, followed by the individual levels. To test the hypotheses at the organizational level, some measures intended to assess individuals' perceptions were

averaged within each organization. The measures used to assess the independent variables are addressed first, followed by the measures used to estimate the dependent variables. Finally, the attitudinal measures used on both surveys are presented. The team-member survey is presented in Appendix C and the non team-member survey in Appendix D.

### **Independent Variables at the Individual level**

#### **Perception of Participation in Decision-Making**

The perception of participation in decision-making was defined as the extent to which participants perceive themselves as involved in making decisions during the kaizen event. The perception of participation in decision-making was assessed using three items. These items were intended to measure the actual participation, the encouragement of participation by others, and the value of participation in decision-making as perceived by others. The wording used in the survey for non team-members was slightly different to make it more meaningful, but the concepts remain the same and for statistical purposes will be considered the same.

#### **Perception of Communication**

The perceived level of one-way communication from the organization to the employees regarding the kaizen event was measured using six items. In addition to the provision of an explanation of a kaizen event, the items assessed management's communication of the reason for having a kaizen event, the date and the duration of the

event, the expected role of the employee, the impact on job responsibilities, and the goal of the kaizen event. The items used for this measure are identical on the team-member survey and the non team-member survey.

### **Perception of Training**

Training has been measured along several different dimensions. Kirkpatrick (1959a, 1959b, 1960a, and 1960b) broke it down into reactions, learning, behavior, and results. Alliger, Tannenbaum, Bennett, Traver, and Shotland (1997) proposed a framework extending Kirkpatrick's taxonomy to include two concepts within the criterion of reactions. These reaction variables are affective reactions, or the liking of the training, and utility judgments, the usefulness of the training for performance objectives. Within the aforementioned meta-analysis, utility reaction correlated somewhat with learning. Utility reaction correlated more highly with job performance than did affective reactions. They concluded that the utility reactions are better predictors of transfer.

This study was concerned primarily with the utility aspect of training, but also included an item to assess the liking of the training. In this study, the perception of the kaizen event training is measured with five items. These items are intended to measure the recipient's reaction to the overall effectiveness of the training, including his or her level of understanding of the training, the style and manner in which the training was delivered, the usefulness of the training, the amount of training, and the timing of the training. The intent was to measure only the training experienced by kaizen team members, and therefore, the measure is not used in the non team-member survey.



## **Dependent Variables at the Individual Level**

### **Perception of Goal Achievement and Other Outcome Variables**

A single item on both the team-member survey and the non team-member survey measured whether the kaizen event achieved its goal. In addition, a series of single item measures assessed a host of contributing factors to success or failure, such as the adequacy of the duration of the kaizen event, the appropriateness of a kaizen event given the scope of the problem, the necessity of a kaizen event, the efficacy of the team composition, the perception that the team-member's participation positively impacted the outcome, the perception that the facilitator presented the majority of the solutions, management intervention, the perception of knowledge sharing, the impact on workloads, and team bonding. Additional single item measures were used on the non team-member survey to assess the change in job responsibilities and the increase in daily workload resulting from the kaizen event. Three items were used to assess the overall impact on the non team-member's job. These items considered the flow of the work, the degree to which all information was considered, and the overall impact on the job.

### **Perception of a Climate of Continuous Improvement**

This measure is defined as the degree to which the organization is perceived as having a climate of continuous improvement. It measures the degree to which the organization values and encourages continuous improvement. In addition, it considers the degree to which other coworkers are believed to value and encourage continuous improvement. This measure is operationalized through six items. These items measure the perceived level of motivation to improve, the degree of willingness to improve, the

actual number of ideas shared, the extent to which management values continuous improvement, and the degree to which other employees value continuous improvement.

The items used for this measure are the same for both surveys.

### **Perception of Motivation to Continuously Improve**

One item was used to measure the degree to which an employee was more likely to look for improvement possibilities at work given his or her experience during the kaizen event.

## **Independent Variables at the Organizational Level**

### **Participation in Decision-Making at the Organizational Level**

Participation in decision-making at the organizational level was measured using the average of all employees' perceptions of participation in decision-making within an organization.

### **Communication at the Organizational Level**

Communication was estimated at the organizational level by averaging employees' perceptions of communication within an organization.

### **Training at the Organizational Level**

Training at the organizational level was measured using the average of team members' perceptions of provided training in each organization. It was assumed that the training would take place during the kaizen event and intended only for team members, so non team-members' perceptions of training were not assessed. Therefore, there were no potential moderating effects of team status to explore.

### **The Facilitator's Level of Expertise**

The facilitator's level of expertise at each organization was rated based on a scale of one to five, where one indicated a level of significant expertise, two indicated a level of moderate expertise, three indicated a level of adequate expertise, four indicated a level of minimal expertise, and five indicated a level of no expertise. These ratings were estimated based on my interviews with management and the facilitator.

### **Layoffs**

Layoffs were coded using reported data from interviews with management with zero representing no layoffs in the past, and one representing less than five layoffs in the past.

### **Turnover**

Turnover was measured at each organization using binary coding, with a zero indicating a low turnover rate, and one indicating a high turnover rate.

### **The Number of Previous Kaizen Events**

The number of previous kaizen events was reported by management at each organization.

### **Dependent Variables at the Organizational Level**

#### **Performance Gains at the Organizational Level**

Organizational performance gains were estimated using a single measure based on my observations and interviews. The performance gains were coded based on a scale from one to five. A kaizen event rating of one indicated an event with completely successful results, a two indicated a mostly successful event, a three indicated an event with no improvement, a four indicated an event with slightly worse results, and a five indicated an event with significantly worse results.

#### **Sustainability**

Sustainability was estimated based on my interviews and observations three to six months after the kaizen event. It estimated the degree to which the implemented changes resulting from the kaizen event were sustained. This measure was rated on a scale of one to five, where one represented sustaining of all changes, two represented sustaining of most changes, three represented sustaining of only a few changes, four represented

sustaining of no changes, and five represented changes that were worse than the initial state.

### **Perception of a Climate of Continuous Improvement**

The climate of continuous improvement at the organizational level was estimated by averaging employees' perceptions of the climate of continuous improvement at each organization.

### **Attitudinal Variables**

#### **Trust**

Five items were adopted and some modified slightly from a seven item scale developed by Robinson and Rousseau (1994), which was modeled after a framework developed by Gabarro and Athos (1976). A one to five scale was used where one equaled strongly agree and five equaled strongly disagree. These items included: “I do not fully trust my employer” and “In general, I believe my employer’s motives and intentions are good.”

#### **Job Security**

A single item was used to measure job security. This item was “I am confident that I will not lose my job in the near future.”

### **Respect for Top Management**

Three items were taken from a scale created by Cook and Wall (1980) that was intended to measure trust in management which the authors defined as “the extent to which one is willing to ascribe good intentions to, and have trust in the words and actions of those in management” (p. 39).

### **Job Satisfaction**

Three items were derived from the Job Diagnostic Survey developed by Hackman and Oldman (1975, 1980) which consisted of 5 items.

### **Commitment**

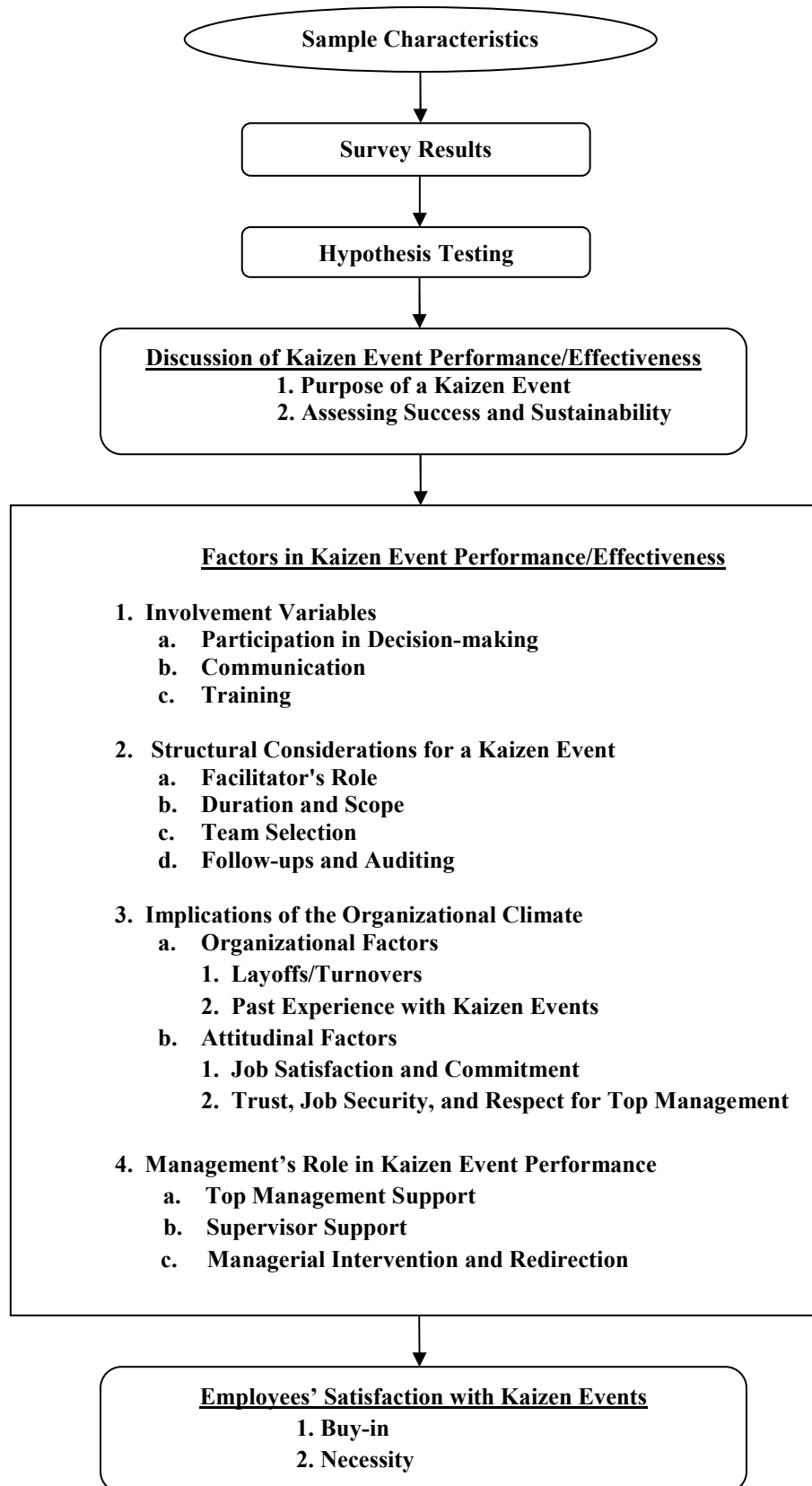
Commitment is defined as an employee’s devotion to an organization and his or her willingness to work above and beyond what is expected if it is in the best interest of the company. I chose six of the nine positively worded items from Mowday, Steers, and Porter’s (1979) 15 item measure. The construct of commitment is often operationalized through job involvement. I used Mowday and Porter’s scale because it reflects organizational commitment.

## CHAPTER IV

### RESULTS

This research focused on thirteen kaizen events at eleven different organizations in Massachusetts. The triangulation method was used to study kaizen events. Triangulation involves the use of several different methods to collect and analyze data in an effort to achieve more accurate and valid results. In essence, this multi-mode analysis not only set out to confirm theories using quantitative methods, but also to generate theories based on qualitative theory. The qualitative research conducted in this dissertation consisted of traditional qualitative stages as outlined by Bryan and Bell (2003). First, the research questions were established. Then the organizations and subjects were selected. Next, the data was collected and interpreted, resulting in theories. In some instances these emerging theories or concepts necessitated further data collection. The quantitative data gathered through surveys was analyzed using correlational analysis and descriptive statistics. Since the reporting of the data and the discussion of the analysis is quite complicated, a diagram is provided in Figure 3, to help the reader understand the structure of the chapter.

**Figure 3. Outline of Chapter 4 Results**





First, the sample characteristics at both the organizational level and the individual level are reported. Next, the survey results are presented without analytical discussion. Then each of the hypotheses is tested using correlational analysis. Finally, the findings and evidence from both the statistical analysis and the qualitative analysis are merged and thoroughly discussed.

The qualitative analysis starts with a discussion of the purpose of a kaizen event from management's perspective. Then, the complexities surrounding the measurement of success and sustainability of kaizen events are addressed. Next, the factors that contribute to the success and sustainability of kaizen events are considered. These factors include the involvement variables (i.e. participation in decision-making, communication, and training), the structural aspects of the kaizen event (i.e. facilitating, duration and scope, team selection, follow-ups and auditing), the organizational climate (i.e. layoffs, turnover, past experience with kaizen events, and attitudinal factors), and management's role (i.e. top management support, middle management support, and managerial intervention and redirection). Finally the analysis is concluded with a discussion of the employees' satisfaction with kaizen events.

### **Sample Characteristics at the Organizational Level**

This study targeted organizations in Western Massachusetts that were sponsoring kaizen events between September 2006 and May 2007. Participants in the study were identified by contacting local organizations that were known to run kaizen events on a regular basis and by attending events such as the Regional Technology Center meeting for local CEOs (held in April, 2006 at the University of Massachusetts in Amherst). A

handout (see Appendix B) was developed to provide information about the study to prospective participants. The Regional Technology Center also sent an email regarding the study to all members of its organization. Organizations conducting kaizen events were also identified through grant-rewarding state agencies, such as the Massachusetts Department of Workforce Development. A grant, called the Workforce Training Fund, is awarded to local organizations for training purposes. In many situations, this money is used toward kaizen event facilitation and training. Therefore, companies that had received money were contacted to see if indeed they were holding kaizen events and if they would like to participate in the study. Four of the participating companies had been awarded grant money from the Work Force Training Fund at some point in time that was applied toward expenses incurred during a kaizen event. Of all the companies contacted for the study, only two of the companies sponsoring future kaizen events declined to take part in the research study. In the end, eleven organizations participated and employees were interviewed and observed at thirteen kaizen events in total.

Of the eleven organizations, approximately 50% were medium size organizations, 40% small size organizations, and 20% were large size organizations (Table 1).

**Table 1. Organizations by Size**

Size of Organization	Frequency	Percent
Small (less than 100 employees)	4	36.4%
Medium (100 to 499 employees)	5	45.4%
Large (500 to 600 employees)	2	18.2%

As seen in Table 2, ten out of eleven of the companies were manufacturers and one was a wholesaler. More specifically, there was a container manufacturer, a mattress manufacturer, a molding and tooling manufacturer, a wholesale distributor, an ice cream manufacturer, a metal laminate supplier, a precision tool manufacturer, a tool and die manufacturer, a polyurethane manufacturer, a defense contractor, and a machine shop for a defense contractor.

**Table 2. Organizations by Industry Type**

Type	Frequency	Percent
Manufacturer – High Tech	4	36.4%
Manufacturer – Low Tech	5	45.4%
Manufacturer - Food	1	9.1%
Wholesaler	1	9.1%

Eight of the eleven participating organizations reported being profitable, one reported being somewhat profitable, and two reported being not profitable (see Table 3).

**Table 3. Organizations by Financial Position**

Financial position	Frequency	Percent
Profitable	8	72.7%
Somewhat profitable	1	9.1%
Not profitable	2	18.2%

Of the eleven organizations, eight were divisions within a larger corporation. Of these eight divisions, six divisions were conducting independent lean activities without having to gain approval from corporate management. Two other organizations were corporate headquarters and therefore had complete autonomy. There was only one organization that was unionized and another company that had a very small union representation. Six out of eleven companies had layoffs within the last five years, and the others had not conducted layoffs in the recent past. The majority of the companies had experienced insignificant or extremely low turnover rates in the past, but two companies reported higher turnover rates. Only one of the eleven organizations did not have a bonus system. Of the organizations having bonus systems, one company had not had a payout over the last seven years due to poor company-wide performance. Seven companies had active suggestion or idea systems, of which two relied on suggestion boxes, and two held meetings to permit idea sharing. Four companies had no idea systems in place.

### **Sample Characteristics at the Individual Level**

The targeted population of the survey was the kaizen event team members and the non team-members who worked in the areas impacted by the kaizen event in each organization. Each kaizen event team included between three and ten members. The non team-members at each organization directly impacted by the kaizen event varied from one to 14 subjects. The team-member survey was administered to 64 individuals and the non team-member survey was administered to 69 employees at a total of 11 organizations, for a total participation sample of 133 employees with a 100% response rate.

Almost 60% of the participants had been working for their present employer for more than five years. 48.2% of the participants were over 45 years old, while 51.8% were younger than 45 years old. 82.7% of the sample was male and 17.3% was female. 66.9% of the participants had attained high school degrees, with 33.1% having obtained higher education degrees including associate's degrees, bachelor's degrees, and graduate degrees. Participants' previous experience with kaizen events varied considerably (40.6% had no experience with events, 20.3% had experience with one other, 20.3% had experience with between two and four events, 16.5% had experience with between five and ten, and 2.3% had experience with more than ten events). Interestingly, over 50% of the non team-members had never been a member of a kaizen event team compared to about 25% of the team members who had no previous kaizen event experience. 21.9% of the team members had achieved a bachelor's degree or a graduate degree compared to 15.9% of the non team-members.

### **Survey Results**

This section presents only the results of the surveys. The analysis of this data is carried out after the reporting of the hypothesis testing. In order to establish a framework for the surveys, in-depth interviews at two local organizations were conducted. Based on the experience and research at the two kaizen events, two separate surveys were developed to best capture the underpinnings of participation in decision-making, communication, and training during the kaizen events. The experiences of team members and non team-members may have been different and the items needed to be modified to capture these potential differences. The survey instruments were pretested during both

preliminary field studies and slight wording modifications were made where concepts needed clarification.

The survey administered to the team members can be found in Appendix C, and the survey administered to the non team-members can be found in Appendix D. The team-member responses to the items in the "results of this kaizen event" section are listed in Table 4, and the non team-member responses are listed in Table 5. For each item, the percentage of respondents who agreed (i.e. responded, "agree" or "strongly agree"), and the percentage of respondents who disagreed (i.e. responded, "disagree" or "strongly disagree") are tabulated. The percentage of participants who responded neutrally were not included in the Table, but can be calculated by subtracting the sum of the agreement and disagreement percentages from 100%.

**Table 4. Team Member Survey Results**

Survey Item #, Topic, and Wording	Agreement (%)	Disagreement (%)
<b>1. Training - timing n = 51</b> The time between the provided training and the application of what was learned was too long.	11.8% Agree	60.8% Disagree
<b>2. Training - understanding n = 54</b> I understood the concepts covered in the training.	72.2% Agree	1.9% Disagree
<b>3. Training - relevance n =54</b> The training I received for this kaizen event was highly relevant and applicable to the targeted problem.	66.7% Agree	0% Disagree
<b>4. Training - not prepared n = 54</b> I would have felt more prepared for the kaizen event if additional topics were covered in the training.	16.7% Agree	40.8% Disagree
<b>5. Training - trainer n = 54</b> The trainer presented the material to be learned in an interesting manner.	70.4% Agree	1.9% Disagree

<b>1. PDM - encouraged n = 64</b> Members of the organization encouraged me to participate in decision-making during the kaizen event.	89.1% Agree	7.8% Disagree
<b>2. PDM - level n = 63</b> I often gave my input during the kaizen event.	96.8% Agree	0% Disagree
<b>3. PDM - limited by feeling of no value n = 63</b> I would have participated more in the decision-making if I felt my input was truly valued.	11.1% Agree	57.2% Disagree
<b>1. Communication - prior explanation n = 64</b> The organization explained kaizen events to us before we held one.	79.7% Agree	7.8% Disagree
<b>2. Communication - reason n = 64</b> The organization told us the reason that we were having this kaizen event.	87.5% Agree	4.7% Disagree
<b>3. Communication - when and how long n = 64</b> Management communicated, well in advance, when we would be having the kaizen event and for how long it would last.	79.7% Agree	12.5% Disagree
<b>4. Communication - role explanation n = 64</b> Prior to the kaizen event, the organization explained what my role would be during the kaizen event.	70.3% Agree	12.5% Disagree
<b>5. Communication - job impact n = 64</b> Representatives of the organization discussed how the kaizen event might impact my job and me.	68.8% Agree	18.7% Disagree
<b>6. Communication - goal n = 64</b> The organization clearly and accurately communicated the goal of the kaizen event.	90.6% Agree	3.2% Disagree
<b>1. Climate of CI - happily share ideas n = 64</b> If I have an idea for improvement, I happily share my suggestion with the organization.	89.1% Agree	4.7% Disagree

<b>2. Climate of CI - look for improvements n = 64</b> I regularly look for ways to improve aspects of my job.	89.1% Agree	3.1% Disagree
<b>3. Climate of CI - share ideas n = 64</b> I share my ideas for improvement with the organization.	64.1% Agree	6.3% Disagree
<b>4. Climate of CI - management indifference n = 64</b> I may as well not look for improvement opportunities because management truly isn't interested in my input.	3.1% Agree	81.3% Disagree
<b>5. Climate of CI - management support n = 64</b> Management strongly supports continuous improvement efforts.	82.8% Agree	1.6% Disagree
<b>6. Climate of CI - employee support of CI n = 64</b> Employees in this organization truly value continuous improvement.	64.1% Agree	12.5% Disagree
<b>1. Performance Goal n = 63</b> The improvement goal of the kaizen event was achieved.	85.7% Agree	0% Disagree
<b>2. Duration - needed more time n = 64</b> If we had more time, our kaizen event team would have been able to make better recommendations.	42.2% Agree	34.4% Disagree
<b>3. Scope - too large n = 64</b> The scope of the improvement was too large for a kaizen event, so we weren't able to adequately address all the issues.	15.6% Agree	73.5% Disagree
<b>4. Information sharing n = 64</b> As a result of this kaizen event, I have a better understanding of work outside of my job responsibilities.	70.3% Agree	4.7% Disagree
<b>5. Workload - behind in work n = 64</b> I am very behind in my regular work because I have been busy with the kaizen event.	21.9% Agree	46.9% Disagree



<b>6. Redirection - management intervened</b> During the kaizen event, management disagreed with our approach to the problem and redirected our efforts.	12.7% Agree	77.8% Disagree
<b>7. Team Composition n = 64</b> Management selected a kaizen team that had the appropriate skills to tackle the problem.	90.6% Agree	3.1% Disagree
<b>8. Bonding - closer relationships n = 64</b> By the end of the kaizen event, the team members developed a closer relationship with each other.	79.7% Agree	0% Disagree
<b>9. Necessity - did not need n = 64</b> Our organization did not need a kaizen event to identify these improvements.	9.4% Agree	75% Disagree
<b>10. Positive participation - impact n = 64</b> My participation in this kaizen event had a positive impact on the outcomes of the kaizen event.	90.6% Agree	1.6% Disagree
<b>11. Facilitation - facilitator idea n = 64</b> The facilitator came up with most of the ideas used in the proposed improvements.	9.4% Agree	70.3% Disagree
<b>12. Desire to participate again n = 64</b> If asked, I would gladly participate in a subsequent kaizen event.	90.6% Agree	1.6% Disagree
<b>13. Satisfaction Kaizen Events n = 64</b> I want the organization to keep having kaizen events.	90.6% Agree	0% Disagree
<b>14. Coworker Satisfaction Kaizen Events n = 63</b> My coworkers want the organization to keep having kaizen events.	57.1% Agree	6.4% Disagree
<b>15. Motivation to Continuously Improve n = 63</b> I am more willing to look for improvements in my work now that I participated in a kaizen event.	66.7% Agree	9.5% Disagree
<b>16. Overall Lean Impact n = 63</b> This kaizen event has brought our organization one step closer to becoming a truly lean organization.	76.2% Agree	1.6% Disagree

**Table 5. Non Team-Member Results**

Survey Item #, Topic, and Wording	Agreement (%)	Disagreement (%)
<b>1. PDM - encouraged n = 66</b> Members of the kaizen event team asked for my input during the kaizen event.	60.6% Agree	33.3% Disagree
<b>2. PDM - level n = 65</b> I made suggestions to the team during the kaizen event.	53.8% Agree	38.5% Disagree
<b>3. PDM - limited by feeling of no value n = 66</b> I would have made more suggestions to the kaizen event team, if I felt my input was truly valued.	36.4% Agree	40.9% Disagree
<b>1. Communication - prior explanation n = 66</b> The organization explained kaizen events to us before we held one.	63.6% Agree	22.7% Disagree
<b>2. Communication - reason n = 66</b> The organization told us the reason that we were having a kaizen event.	69.7% Agree	18.2% Disagree
<b>3. Communication - when and how long n = 66</b> Management communicated, well in advance, when we would be having the kaizen event and for how long it would last.	60.6% Agree	25.8% Disagree
<b>4. Communication - role explanation n = 64</b> Prior to the kaizen event, the organization explained what would be required of me during the kaizen event.	43.9% Agree	37.9% Disagree
<b>5. Communication - job impact n = 64</b> Representatives of the organization discussed how the kaizen event might impact my job and me.	56.1% Agree	31.8% Disagree
<b>6. Communication - goal n = 64</b> The organization clearly and accurately communicated the goal of this kaizen event.	65.2% Agree	27.3% Disagree

<b>1. Climate of CI - happily share ideas n = 66</b> If I have an idea for improvement, I happily share my suggestion with the organization.	66.7% Agree	19.7% Disagree
<b>2. Climate of CI - look for improvements n = 66</b> I regularly look for ways to improve aspects of my job.	74.2% Agree	13.7% Disagree
<b>3. Climate of CI - share ideas n = 66</b> I share my ideas for improvement with the organization.	57.6% Agree	24.3% Disagree
<b>4. Climate of CI - management indifference n = 66</b> I may as well not look for improvement opportunities because management truly is not interested in my input.	40.9% Agree	37.9% Disagree
<b>5. Climate of CI - management support n = 66</b> Management strongly supports continuous improvement efforts.	54.5% Agree	27.2% Disagree
<b>6. Climate of CI - employee support of CI n = 64</b> Employees in this organization truly value continuous improvement.	60.6% Agree	24.3% Disagree
<b>1. Performance Goal n = 69</b> The improvement goal of the kaizen event was achieved.	47.8% Agree	13% Disagree
<b>2. Job Responsibilities - change n = 69</b> My job responsibilities have changed a great deal as a result of the kaizen event.	26.5% Agree	53.4% Disagree
<b>3. Workload - greater n = 69</b> My daily workload is much greater as a result of the kaizen event.	18.8% Agree	53.6% Disagree
<b>4. Job Process - streamlined n = 69</b> The kaizen event has streamlined my work.	31.9% Agree	39.1% Disagree
<b>5. Improvement - limitations n = 69</b> Improvements in the targeted area will be limited because there are details about the work that the team did not consider.	20.3% Agree	30.4% Disagree

<b>6. Scope - too large n = 69</b> The scope of the improvement opportunities was too large for a kaizen event, so all the issues weren't adequately addressed.	13.0% Agree	33.3% Disagree
<b>7. Overall Impact - positive n = 69</b> Overall, the kaizen event has impacted my job positively.	50.7% Agree	14.5% Disagree
<b>8. Motivation to Continuously Improve n = 68</b> As a result of the kaizen event, I am more willing to look for possible improvements in my work.	61.8% Agree	14.7% Disagree
<b>9. Overall Lean Impact n = 68</b> This kaizen event has brought our organization one step closer to becoming a truly lean organization.	51.6% Agree	17.6% Disagree
<b>10. Satisfaction Kaizen Events n = 68</b> I want the organization to keep having kaizen events.	60.3% Agree	8.8% Disagree
<b>11. Coworker Satisfaction Kaizen Events n = 68</b> My coworkers want the organization to keep having kaizen events.	29.4% Agree	11.8% Disagree

Table 6 offers a comparison of the responses of team members with the responses of non team-members on selected survey items that were the same for both groups. Survey results, including the differences between team members' and non team-members' perceptions, are woven throughout the analysis to facilitate discussion of the key findings.

**Table 6. Comparison of Team Member and Non Team-Member Results**

Survey Topic	Team Member Agreement	Non Team-Member Agreement	Team Member Disagreement	Non Team-Member Disagreement
<b>PDM - encouraged</b>	89.1%	60.6%	7.8%	33.3%
<b>PDM - level</b>	96.8%	53.8%	0%	38.5%
<b>PDM - limited by feeling of no value</b>	11.1%	36.4%	57.2%	40.9%
<b>Communication - prior explanation</b>	79.7%	63.6%	7.8%	22.7%
<b>Communication - reason</b>	87.5%	69.7%	4.7%	18.2%
<b>Communication - when and how long</b>	79.7%	60.6%	12.5%	25.8%
<b>Communication - role explanation</b>	70.3%	43.9%	12.5%	37.9%
<b>Communication - job impact</b>	68.8%	56.1%	18.7%	31.8%
<b>Communication - goal</b>	90.6%	65.2%	3.2%	27.3%
<b>Climate of CI - happily share ideas</b>	89.1%	66.7%	4.7%	19.7%
<b>Climate of CI - look for improvements</b>	89.1%	66.7%	3.1%	19.7%
<b>Climate of CI - share ideas</b>	64.1%	57.6%	6.3%	24.3%
<b>Climate of CI - management indifference</b>	3.1%	40.9%	81.3%	37.9%
<b>Climate of CI - management support</b>	82.8%	54.5%	1.6%	27.2%
<b>Climate of CI - employee support of CI</b>	64.1%	60.6%	12.5%	24.3%
<b>Performance Goal Achieved</b>	85.7%	47.8%	0%	13%
<b>Scope - too large</b>	15.6%	13.0%	73.5%	33.3%
<b>Satisfaction Kaizen Events</b>	90.6%	60.3%	0%	8.8%
<b>Coworker Satisfaction Kaizen Events</b>	57.1%	29.4%	6.4%	11.8%
<b>Overall Lean Impact</b>	76.2%	51.5%	1.6%	17.6%
<b>Motivation to Continuously Improve</b>	66.7%	61.8%	9.5%	14.7%

### Scale Reliabilities

Reliabilities for the multi-item measures of interest are given in Table 7. Coefficient alpha is typically calculated to measure the internal consistency of a multi-item measure. Internal reliability represents the degree to which each of the items of a scale represents the same construct (Spector, 1992, p. 65). Most scales used in this

research had good reliability with Cronbach's Alpha greater than 0.70, but there were a few with questionable reliability. The training measure had a reliability of 0.615. These items targeting kaizen event team members only measured training administered during the kaizen event, and didn't assess training that occurred prior to the kaizen event. In some cases general lean training was conducted company-wide well before the kaizen event and this too was not captured in the training survey measure. The reliability of the participation in decision-making measure would have been improved if the third item was eliminated from the measure. The first two items measured the level of participation in decision-making, while the third item assessed whether the employee was reluctant to participate in decision-making because he or she felt the input was not truly valued. The third item read, "I would have made more suggestions, if I felt my input was truly valued." In actuality, the employee may have participated in decision-making minimally, but not necessarily because the employee felt his or her input was not valued. There could have been a host of reasons for non-participation. Perhaps, the employee simply was not asked or given the opportunity. Maybe the employee simply did not feel motivated or compelled to offer suggestions. Cronbach's Alpha for the participation in decision-making measure without this item would have been 0.881.

Surprisingly, the job satisfaction measure had low reliability (Cronbach's Alpha of 0.656) despite the fact that the items were adopted from a measure that has been proven to be reliable in the past. Perhaps, because of the nature of the survey and its timing immediately following the implementation of the kaizen event, there were respondents who wavered in their believed job satisfaction and therefore didn't respond consistently to the job satisfaction items. In other words, the employee may have been unsatisfied

with the kaizen event experience and although he or she was generally happy with his or her job, the negative feelings associated with the kaizen event may have been temporarily impacting the overall level of job satisfaction.

**Table 7. Cronbach's Alphas for Multi-Item Measures**

Multi-Item Measure	Cronbach's Alpha
Training (5 items)	0.615
Participation in Decision-making (3 items)	0.600
Communication (6 items)	0.920
Climate of Continuous Improvement (6 items)	0.698
Trust (5 items)	0.861
Respect in Top Management (3 items)	0.880
Job Satisfaction (3 items)	0.656
Commitment (6 items)	0.815

### **Hypothesis Testing**

This study included primarily ordinal data. Ordinal data consists of a scale that implies an ordered relationship, whereby one measurement is greater than or less than another. Not all concepts measured in this study used Likert scales with multiple items. Many concepts were assessed using a single question with an ordinal scale. Attitudinal scales with multiple items are often considered interval, which assumes that the difference between ranks is equal. For example, interval data presumes that the difference between “strongly agree” and “agree” is equal to the difference between

“strongly disagree” and “disagree”. When the data is interval or ratio, parametric statistical tests are appropriate and the measure of central tendency is represented by the arithmetic mean. When assessing ordinal data, non-parametric tests are typically used because the assumptions of parametric testing are not required and the effects of outliers are minimized. The sample size is an important consideration when deciding whether to use parametric or non-parametric tests. If the sample size is large, the central limit theorem allows for a robust analysis using a parametric test whether or not the sample is from a population with a normal distribution. However, if the sample size is small, a parameter test may be inaccurate while a non-parametric test may be deficient in statistical power (Cooper & Schindler, 1998, p. 164).

The relationships were tested using Spearman's Rho Coefficient as opposed to Pearson's Coefficient due to the ordinal nature of the data and the inclusion of many single item measures in this exploratory study. There was no normality assumption made when using Spearman's Rho Coefficient and outliers are not as impactful (Cooper & Schindler, 1998, p. 163). Although Spearman's Rho Coefficient is reported in the results, Pearson's r Coefficient and Kendall tau b Rho Coefficient are listed in Appendix E. Kendall's tau b corrects for ties. There were only a few minor differences between each of these correlation coefficients.

In order to test the hypotheses of interest, each hypothesis was rewritten as multiple hypotheses. Hypotheses H1 through H4 were developed at the organizational level and H5 through H7 were developed at the individual or employee level. The moderating effect of team status (team-member or non team-member) was explored in selected hypotheses. The following scale was used to describe the strength of each



relationship: a correlation coefficient of less than .4 was considered weak, less than .7 but equal to or more than .4 was deemed moderate, and equal to or more than .7 was deemed strong. The findings will be discussed in further detail in the discussion following the correlational analysis results.

### Hypotheses at the Organizational Level

**Finding for Hypothesis H1: Participation in decision-making, communication, and training will be positively related to kaizen event performance gains, sustainability, and a climate of continuous improvement.**

Hypothesis H1 was rewritten as nine separate hypotheses, H1a through H1i. The correlations for the variables are listed in Table 8.

**Table 8. Hypothesis H1 Correlations**

	Spearman's Rho	Performance Gains	Sustainable	Climate of CI
PDM	Correlation Coefficient	.658(*)	.716(*)	.882(**)
	Sig. (2-tailed)	.028	.013	.000
	N	11	11	11
Communication	Correlation Coefficient	.857(**)	.850(**)	.836(**)
	Sig. (2-tailed)	.001	.001	.001
	N	11	11	11
Training	Correlation Coefficient	-.100	-.086	.518
	Sig. (2-tailed)	.783	.814	.125
	N	10	10	10

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

H1a. Participation in decision-making will be positively related to kaizen event performance gains.

NO SUPPORT: TEAM MEMBERS

STRONG SUPPORT: NON TEAM-MEMBERS

H1b. Participation in decision-making will be positively related to sustainability.

NO SUPPORT: TEAM MEMBERS

STRONG SUPPORT: NON TEAM-MEMBERS

H1c. Participation in decision-making will be positively related to a climate of continuous improvement.

MODERATE SUPPORT: TEAM MEMBERS

STRONG SUPPORT: NON TEAM-MEMBERS

**Table 9. Hypotheses H1a, H1b, and H1c Correlations**

PDM by	Spearman's Rho	Performance Gains	Sustainable	Climate of CI
Non Team-Members	Correlation Coefficient	.857(**)	.850(**)	.900(**)
	Sig. (2-tailed)	.001	.001	.000
	N	11	11	11
Team Members	Correlation Coefficient	-.125	-.072	.620(*)
	Sig. (2-tailed)	.714	.833	.042
	N	11	11	11

\*\* Correlation is significant at the 0.01 level (2-tailed).

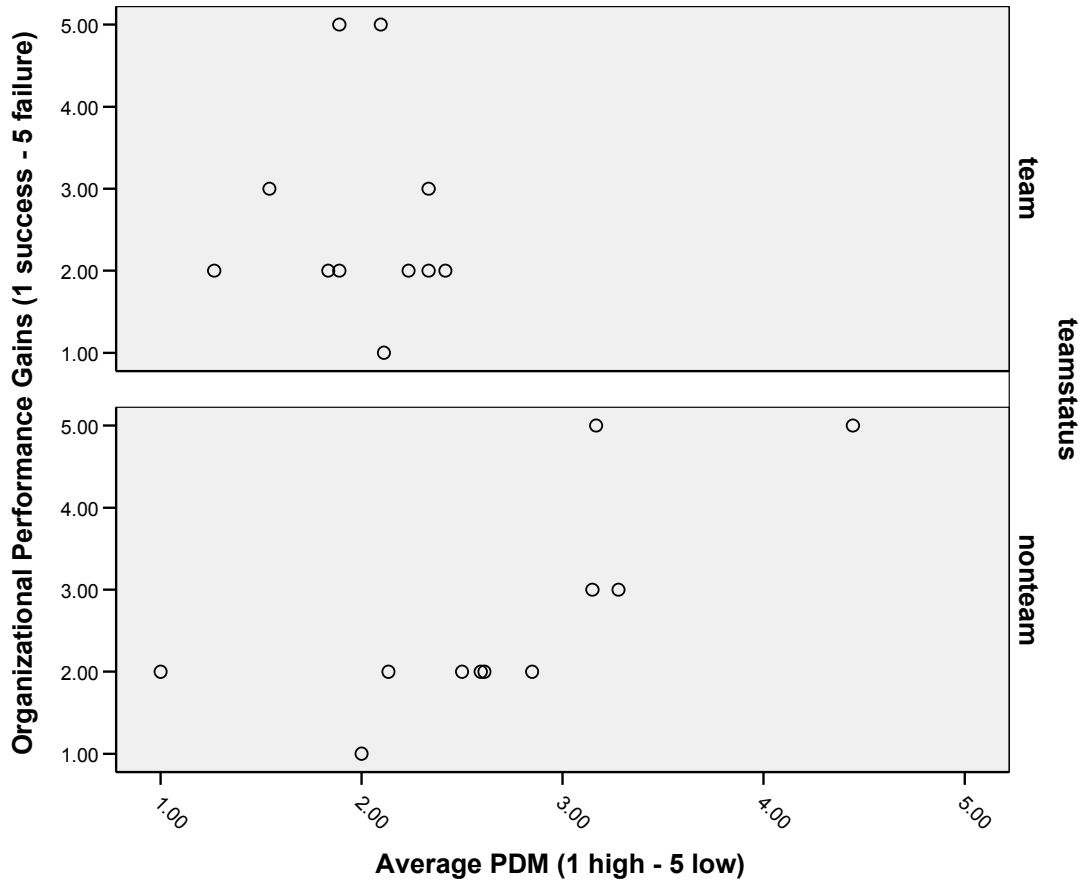
\* Correlation is significant at the 0.05 level (2-tailed).

- Finding for Hypothesis H1a: Participation in decision-making will be positively related to kaizen event performance gains.

The bivariate relationship was significant based on Spearman's Rho ( $\rho = 0.658$ ,  $p = 0.028$ ) as seen in Table 1. Further investigation revealed that when team-member status was taken into account there was a significant relationship with a relatively strong in magnitude relationship between participation in decision-making and performance gains for non team-members only ( $\rho = 0.857$ ,  $p = 0.001$ ) (Table 9). Surprisingly, for team members there was no significant relationship, although, this finding could be

because most team members felt that they participated in the decision-making adequately during the kaizen events. In effect, team members' participation in decision-making during the kaizen event is generally expected and encouraged. Some of these kaizen events were successful and some not successful. The level of non team-member participation in decision-making, on the other hand, varied considerably (see Figure 4). The likelihood of a successful kaizen event was more dependent on the non team-members' participation in decision-making. This phenomenon will be discussed in more detail within the topic discussions to follow this section on hypothesis testing. In conclusion, hypothesis H1a was partially supported with a significant result for non team-members only.

**Figure 4. Graph of Participation in Decision-Making by Performance Gains**

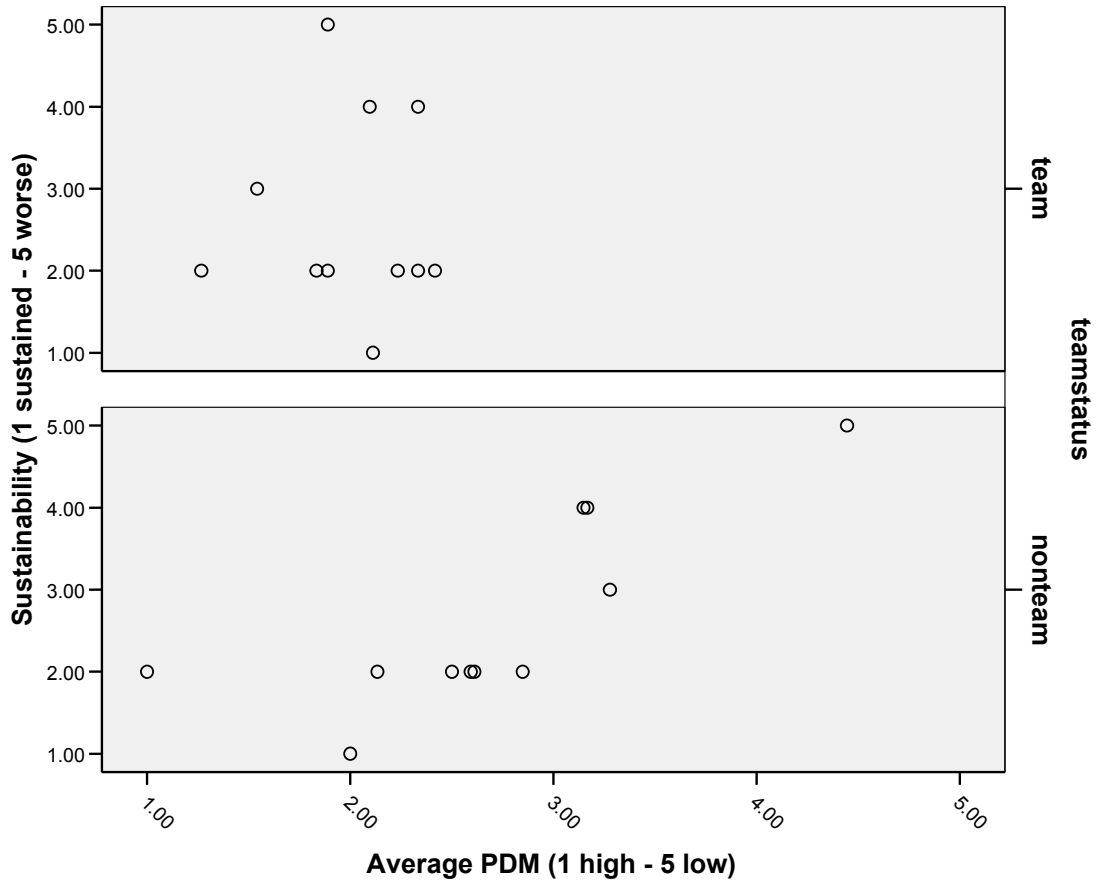


- Finding for Hypothesis H1b: Participation in decision-making will be positively related to sustainability.

Although, the magnitude of the significant relationship was strong ( $\rho = 0.716$ ,  $p = 0.013$ ) (see Table 1), further investigation revealed that the relationship was significant for non team-members only ( $\rho = 0.850$ ,  $p = 0.001$ ) (see Table 2). Again, the level of participation in decision-making by team members was typically perceived as strong, and therefore, there were instances where high levels of team-member participation in decision-making resulted in kaizen events that did not sustain (see Figure 5). The average reported participation in decision-making by team members at each organization

was significant regardless of the kaizen event outcomes. In conclusion, this hypothesis was partially supported with a significant result for non team-members only.

**Figure 5. Graph of Participation in Decision-Making by Sustainability**

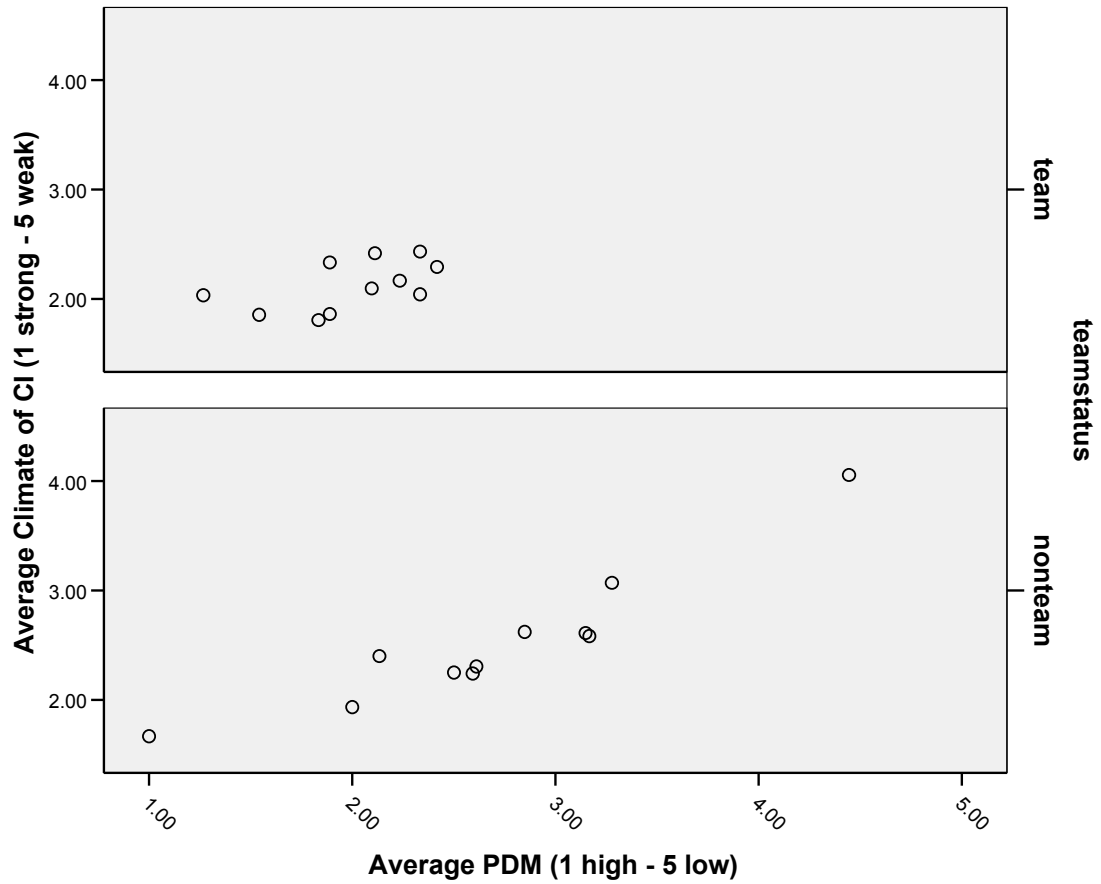


- Finding for Hypothesis H1c: Participation in decision-making will be positively related to a climate of continuous improvement.

Correlations from Table 1 reveal that the magnitude of the relationship was strong ( $\rho = 0.882$ ,  $p = 0.000$ ). When the moderating effect of team-member status was considered, the resulting relationship was more significant for team members ( $\rho =$

0.900,  $p = 0.000$ ) versus non team-members ( $\rho = 0.620$ ,  $p = 0.042$ ). In conclusion, this hypothesis was supported.

**Figure 6. Graph of Participation in Decision-Making by Climate of Continuous Improvement**



H1d. Communication will be positively related to kaizen event performance gains.

NO SUPPORT: TEAM MEMBERS

STRONG SUPPORT: NON TEAM-MEMBERS

H1e. Communication will be positively related to sustainability.

NO SUPPORT: TEAM MEMBERS

STRONG SUPPORT: NON TEAM-MEMBERS

H1f. Communication will be positively related to climate of continuous improvement.

NO SUPPORT: TEAM MEMBERS

STRONG SUPPORT: NON TEAM-MEMBERS

**Table 10. Hypotheses H1d, H1e, and H1f Correlations**

Communication by	Spearman's Rho	Performance Gains	Sustainable	Climate of CI
Non Team-Members	Correlation Coefficient	.797(**)	.765(**)	.864(**)
	Sig. (2-tailed)	.003	.006	.001
	N	11	11	11
Team Members	Correlation Coefficient	-.005	.040	.327
	Sig. (2-tailed)	.988	.908	.326
	N	11	11	11

\*\* Correlation is significant at the 0.01 level (2-tailed).

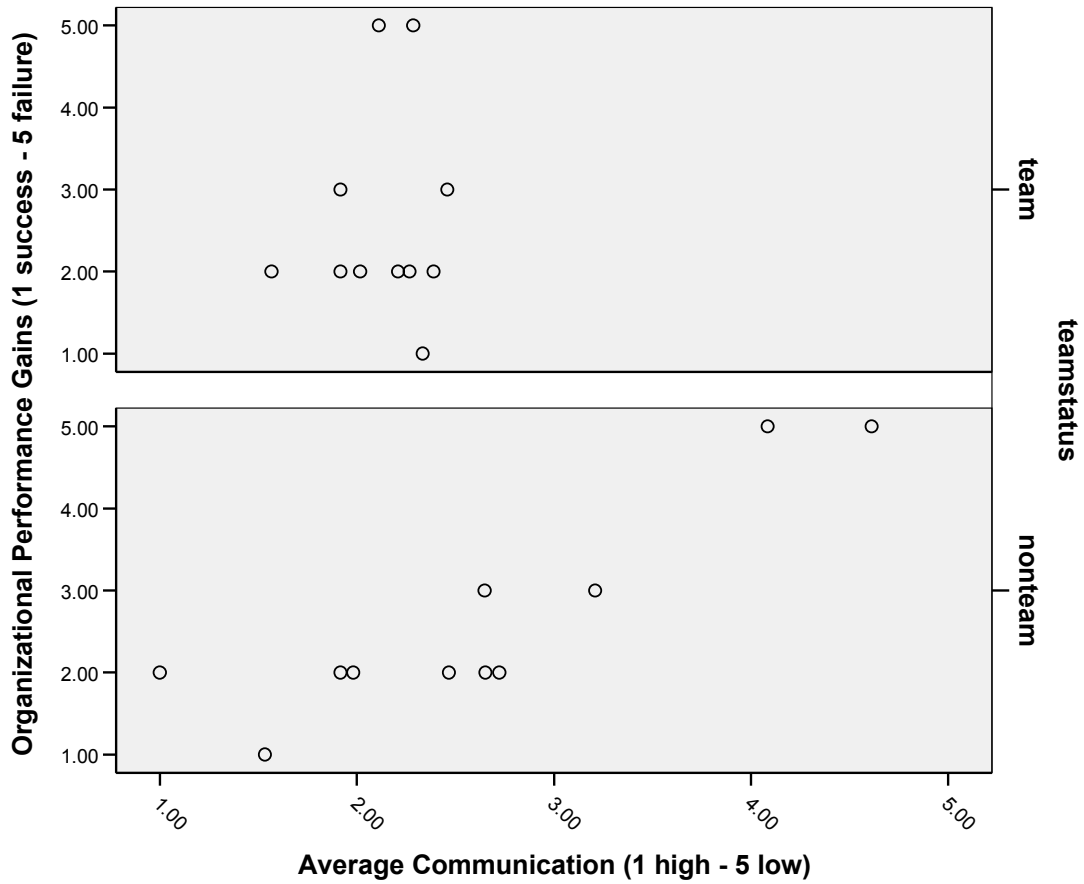
\* Correlation is significant at the 0.05 level (2-tailed).

- Finding for Hypothesis H1d: Communication will be positively related to kaizen event performance gains.

The magnitude of the significant relationship was strong ( $\rho = 0.857$ ,  $p = 0.001$ ) (see Table 8). When the moderating effect of team status was considered, the resulting relationship was significant for non team-members only ( $\rho = 0.797$ ,  $p = 0.003$ ) (see Table 10). As with participation in decision-making, the team members reported consistently high levels of communication, regardless of the kaizen event outcomes. In

conclusion, this hypothesis was partially supported with a significant result for non team-members only.

**Figure 7. Graph of Communication by Performance Gains**



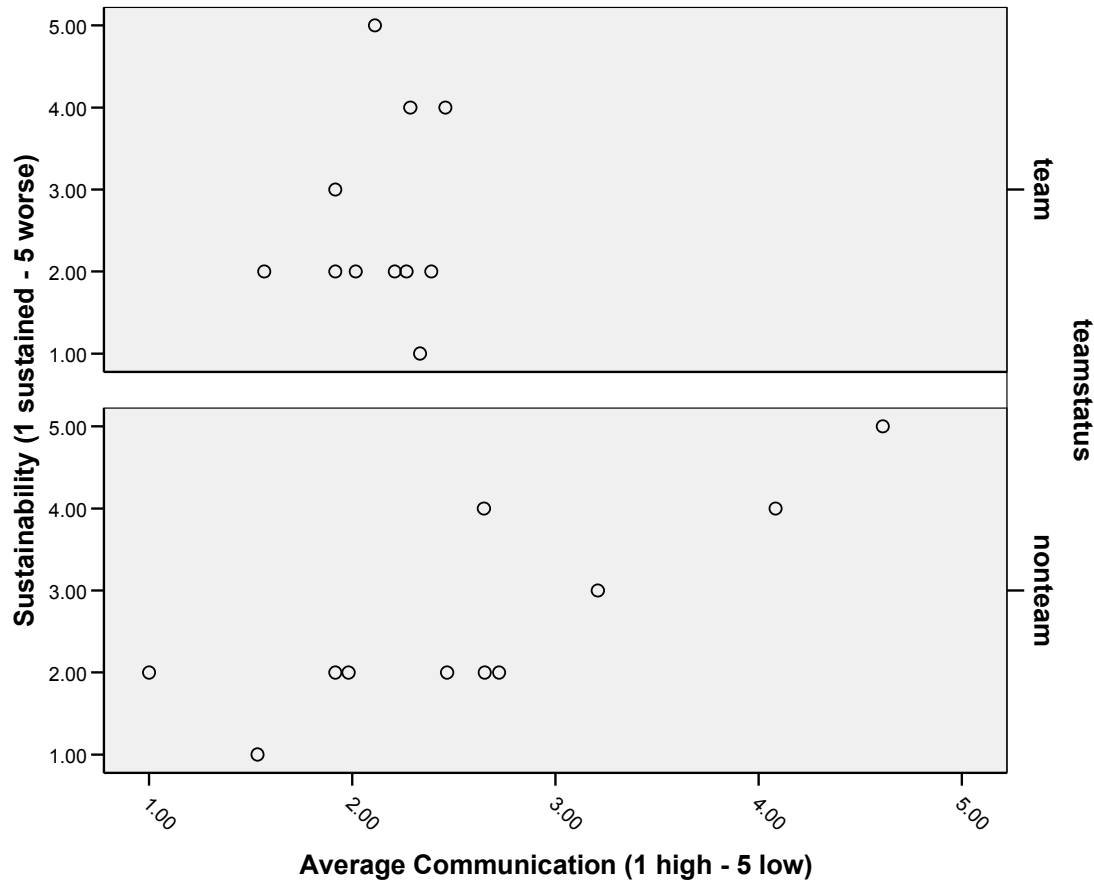
- Finding for Hypothesis H1e: Communication will be positively related to sustainability.

The magnitude of the significant relationship was strong ( $\rho = 0.850$ ,  $p = 0.001$ ) (see Table 8). When the moderating effect of team status was considered, the resulting relationship was significant for non team-members only ( $\rho = 0.850$ ,  $p = 0.001$ ) (see



Table 10). In conclusion, this hypothesis was partially supported with a significant result for non team-members only.

**Figure 8. Graph of Communication by Sustainability**

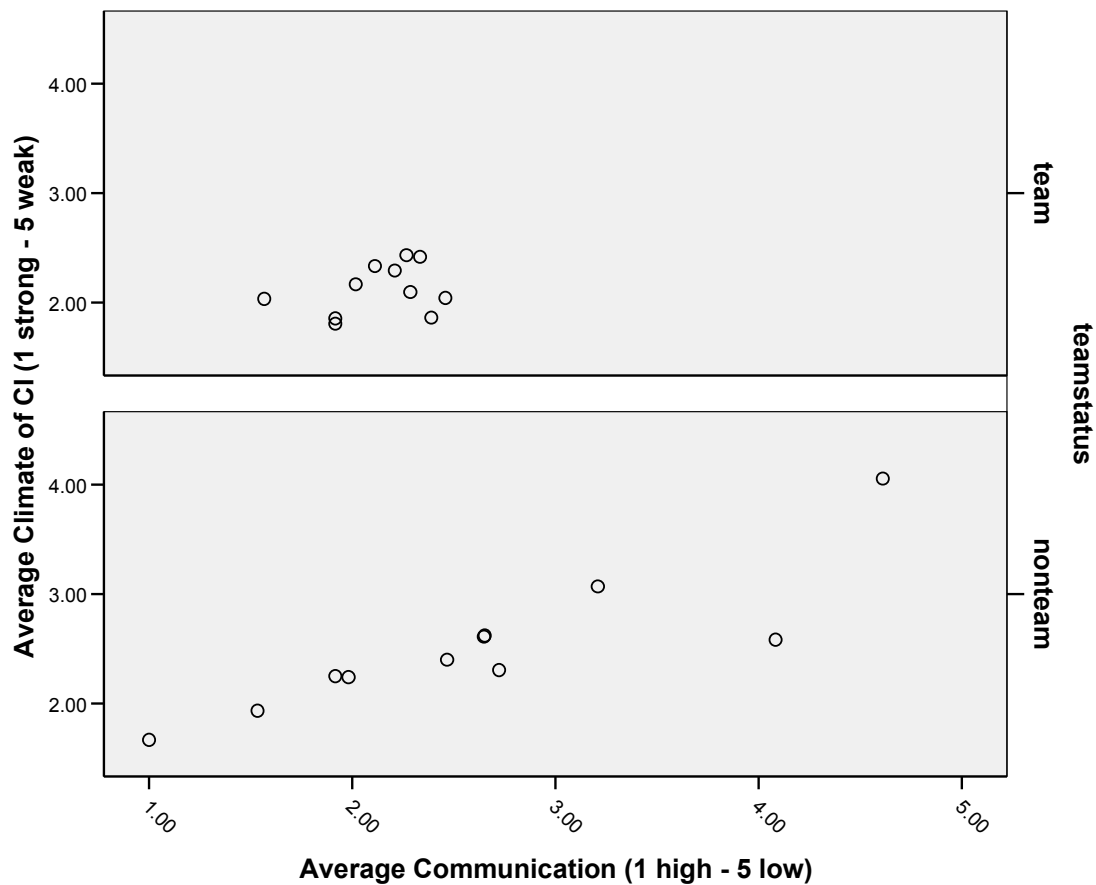


- Finding for Hypothesis H1f: Communication will be positively related to a climate of continuous improvement.

The magnitude of the significant relationship was strong ( $\rho = 0.836$ ,  $p = 0.001$ ) (see Table 8). When team status was considered, the resulting relationship was significant for non team-members only ( $\rho = 0.864$ ,  $p = 0.001$ ) (see Table 10). As can be seen in Figure 9, the team members reported strong levels of communication and high

levels of continuous improvement, but the non team-members who reported high levels of continuous improvement also reported high levels of communication. In conclusion, this hypothesis was partially supported with a significant result for non team-members only.

**Figure 9. Graph of Communication by Climate of Continuous Improvement**



H1g. Training will be positively related to kaizen event performance gains.

NO SUPPORT

H1h. Training will be positively related to sustainability.

NO SUPPORT

H1i. Training will be positively related to a climate of continuous improvement.

NO SUPPORT

- Finding for Hypothesis H1g: Training will be positively related to kaizen event performance gains.

The level of training was not related to kaizen event outcomes. This unexpected finding can be explained by the fact that all team members reported high levels of training regardless of outcomes. This hypothesis was not supported ( $\rho = -0.100$ ,  $p = 0.783$ ) (see Table 8.)

- Finding for Hypothesis H1h: Training will be positively related to sustainability.

This hypothesis was not supported ( $\rho = -0.086$ ,  $p = 0.814$ ) (see Table 1).

- Finding for Hypothesis H1i: Training will be positively related to a climate of continuous improvement.

This hypothesis was not supported ( $\rho = 0.518$ ,  $p = 0.125$ ) (see Table 1).

**Finding for Hypothesis H2: The facilitator's level of expertise will be positively related to performance gains.**

**Table 11. Hypothesis H2 Correlation**

Spearman's Rho		Performance Gains
Facilitator Exp	Correlation Coefficient	-.048
	Sig. (2-tailed)	.889
	N	11

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

H2. The facilitator's level of expertise will be positively related to performance gains.  
NO SUPPORT

Possible explanations for this finding are presented in the topic discussions area. It is interesting to note that the status of the facilitator (i.e. whether an internal facilitator or a hired outside consultant, or external facilitator) was not significantly correlated with any of the kaizen event outcomes. Possible explanations for this will also be discussed later. In conclusion, there was no support for this hypothesis ( $\rho = -0.048$ ,  $p = 0.889$ ) (see Table 11).

**Finding for Hypothesis H3: Layoffs and turnover will be negatively related to kaizen event performance gains, sustainability, and a climate of continuous improvement.**

Hypothesis H3 was rewritten as six separate hypotheses, H3a through H3f.

**Table 12. Hypothesis H3 Correlations**

	Spearman's Rho	Performance Gains	Sustainable	Climate of CI
Layoffs	Correlation Coefficient	.095	.158	.405
	Sig. (2-tailed)	.781	.643	.217
	N	11	11	11
Turnover	Correlation Coefficient	.082	.163	-.075
	Sig. (2-tailed)	.811	.632	.827
	N	11	11	11

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

H3a. Layoffs will be negatively related to kaizen event performance gains.  
NO SUPPORT

H3b. Layoffs will be negatively related to sustainability.  
NO SUPPORT

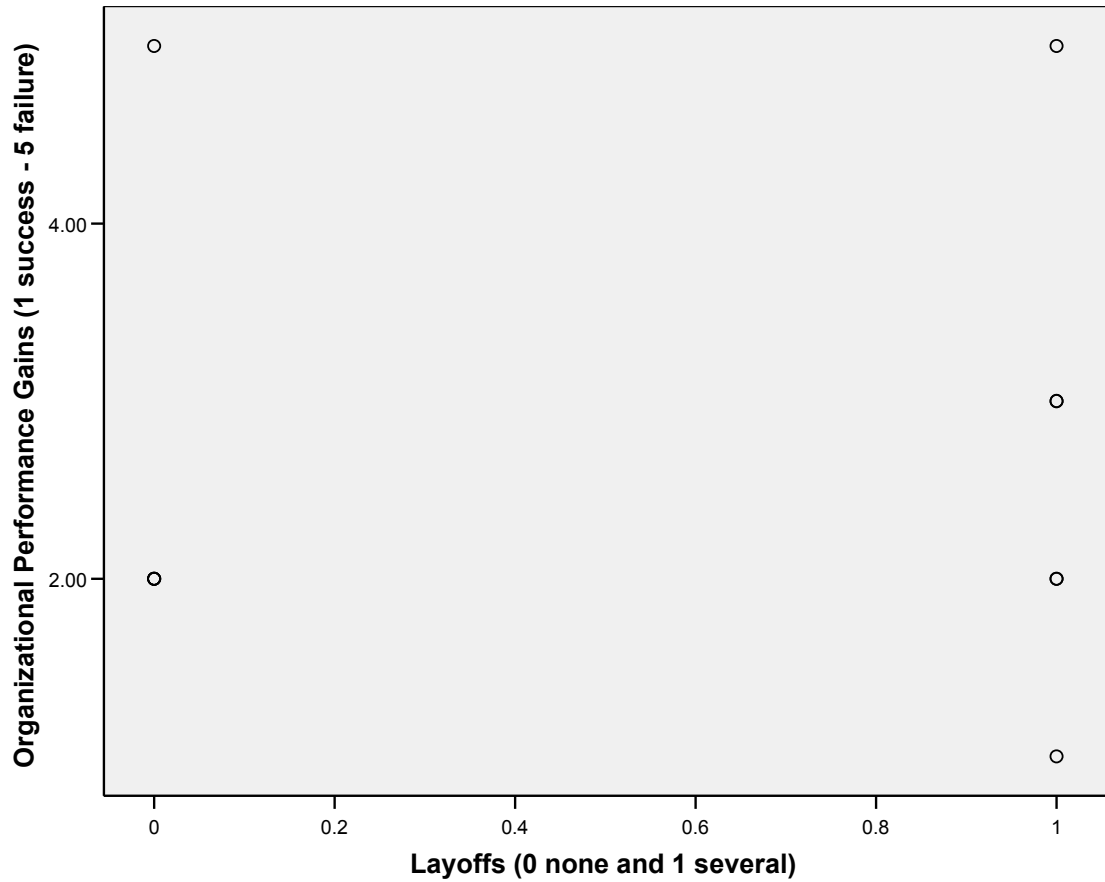
H3c. Layoffs will be negatively related to a climate of continuous improvement.  
NO SUPPORT

- Finding for Hypothesis H3a: Layoffs will be negatively related to kaizen event performance gains.

There was no support for this hypothesis ( $\rho = 0.095$ ,  $p = 0.781$ ) (see Table 5).

The lack of a significant relationship between the layoffs and the performance gains could be due to the small variation and the dichotomous nature of the variable, layoff.

**Figure 10. Graph of Layoffs by Performance Gains**



- Finding for Hypothesis H3b: Layoffs will be negatively related to sustainability. There was no support for this hypothesis ( $\rho = 0.158$ ,  $p = 0.643$ ) (see Table 5).
- Finding for Hypothesis H3c: Layoffs will be negatively related to a climate of continuous improvement. There was no support for this hypothesis ( $\rho = 0.405$ ,  $p = 0.217$ ) (see Table 12).

H3d. Turnover will be negatively related to kaizen event performance gains.  
NO SUPPORT

H3e. Turnover will be negatively related to sustainability.  
NO SUPPORT

H3f. Turnover will be negatively related to a climate of continuous improvement.  
NO SUPPORT

- Finding for Hypothesis H3d: Turnover will be negatively related to kaizen event performance gains.

There was no support for this hypothesis ( $\rho = 0.082$ ,  $p = 0.811$ ) (see Table 12).

- Finding for Hypothesis H3e: Turnover will be negatively related to sustainability.

There was no support for this hypothesis ( $\rho = 0.163$ ,  $p = 0.632$ ) (see Table 5).

- Finding for Hypothesis H3f: Turnover will be negatively related to a climate of continuous improvement.

There was no support for this hypothesis ( $\rho = -.075$ ,  $p = 0.827$ ) (see Table 12).

**Finding for Hypothesis H4: The number of previous kaizen events will be positively related to performance gains, sustainability, and a climate of continuous improvement.**

Hypothesis H4 was rewritten as three separate hypotheses, H4a through H4c.

**Table 13. Hypothesis H4 Correlations**

Spearman's Rho		Performance Gains	Sustainable	Climate of CI
No. Prev Events	Correlation Coefficient	.270	.217	-.210
	Sig. (2-tailed)	.421	.521	.535
	N	11	11	11

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

H4a. The number of previous kaizen events will be positively related to performance gains.

NO SUPPORT

H4b. The number of previous kaizen events will be positively related to sustainability.

NO SUPPORT

H4c. The number of previous kaizen events will be positively related to a climate of continuous improvement.

NO SUPPORT

- Finding for Hypothesis H4a: The number of previous kaizen events will be positively related to performance gains.

There was no support for this hypothesis ( $\rho = 0.270$ ,  $p = 0.421$ ) (see Table 13).

- Finding for Hypothesis H4b: The number of previous kaizen events will be positively related to sustainability.

There was no support for this hypothesis ( $\rho = 0.217$ ,  $p = 0.521$ ) (see Table 13).



- Finding for Hypothesis H4c: The number of previous kaizen events will be positively related to a climate of continuous improvement.

There was no support for this hypothesis ( $\rho = 0.606$ ,  $p = 0.048$ ) (see Table 13).

### Hypotheses at the Individual Level

**Finding for Hypothesis H5: The employee's perception of participation in decision-making, communication, and training will be positively related to the employee's perception of goal achievement, motivation to continuously improve, and a climate of continuous improvement.**

Hypothesis H5 was rewritten as nine separate hypotheses, H5a through H5i.

**Table 14. Hypothesis H5 Correlations**

	Spearman's Rho	Goal Achievement	Motivation to CI	Climate of CI
PDM	Correlation Coefficient	.397(**)	.153	.540(**)
	Sig. (2-tailed)	.000	.084	.000
	N	129	128	130
Communication	Correlation Coefficient	.466(**)	.388(**)	.577(**)
	Sig. (2-tailed)	.000	.000	.000
	N	129	128	130
Training	Correlation Coefficient	.238	.278(*)	.279(*)
	Sig. (2-tailed)	.086	.042	.041
	N	53	54	54

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

H5a. The employee's perception of participation in decision-making will be positively related to the employee's perception of goal achievement.

NO SUPPORT: TEAM MEMBERS

WEAK SUPPORT: NON TEAM-MEMBERS

H5b. The employee's perception of participation in decision-making will be positively related to a general motivation to continuously improve.

NO SUPPORT

H5c. The employee's perception of participation in decision-making will be positively related to climate of continuous improvement.

NO SUPPORT: TEAM MEMBERS

MODERATE SUPPORT: NON TEAM-MEMBERS

**Table 15. Hypotheses H5a, H5b, and H5c Correlations**

PDM by	Spearman's Rho	Goal Achievement	Motivation to CI	Climate of CI
Non Team-Members	Correlation Coefficient	.340(**)	.242	.651(**)
	Sig. (2-tailed)	.005	.052	.000
	N	66	65	66
Team Members	Correlation Coefficient	.197	-.009	.235
	Sig. (2-tailed)	.122	.945	.062
	N	63	63	64

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

- Finding for Hypothesis H5a: The employee's perception of participation in decision-making will be positively related to the employee's perception of goal achievement.

The relationship between participation in decision-making and the employee's perception of goal achievement was rather weak in magnitude, but significant. ( $\rho = 0.397$ ,  $p = 0.000$ ) (see Table 14). Further cross-tabulation analysis revealed that this relationship was moderated by the team-member status of the employee (i.e. whether or

not the employee was a team-member). The results indicate that participation in decision-making is correlated with goal achievement significantly for non team-members only ( $\rho = 0.340$ ,  $p = 0.005$ ) (see Table 15). This again can be explained by the fact that team members reported high levels of participation in decision-making in almost all cases.

- Finding for Hypothesis H5b: The employee's perception of participation in decision-making will be positively related to a general motivation to continuously improve.

No significant relationship was found between participation in decision-making and a general motivation to continuously improve ( $\rho = 0.153$ ,  $p = 0.084$ ) (see Table 14).

- Finding for Hypothesis H5c: The employee's perception of participation in decision-making will be positively related to a climate of continuous improvement.

A significant but weak in magnitude, relationship was found between participation in decision-making and a climate of continuous improvement ( $\rho = 0.540$ ,  $p = 0.000$ ) (see Table 14). Further investigation revealed that the relationship is also significant for non team-members only ( $\rho = 0.651$ ,  $p = 0.000$ ) (see Table 15).

H5d. The employee's perception of communication will be positively related to the employee's perception of goal achievement.

WEAK SUPPORT: TEAM MEMBERS

MODERATE SUPPORT: NON TEAM-MEMBERS

H5e. The employee's perception of communication will be positively related to a general motivation to continuously improve.

WEAK SUPPORT: TEAM MEMBERS

MODERATE SUPPORT: NON TEAM-MEMBERS

H5f. The employee's perception of communication will be positively related to a climate of continuous improvement.

NO SUPPORT: TEAM MEMBERS

STRONG SUPPORT: NON TEAM-MEMBERS

**Table 16. Hypotheses H5d, H5e, and H5f Correlations**

Communication by	Spearman's Rho	Goal Achievement	Motivation to CI	Climate of CI
Non-Team Members	Correlation Coefficient	.538(**)	.469(**)	.881 (**)
	Sig. (2-tailed)	.000	.000	.000
	N	66	65	66
Team Members	Correlation Coefficient	.269(*)	.288(*)	.127
	Sig. (2-tailed)	.033	.022	.316
	N	63	63	64

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

- Finding for Hypothesis H5d: The employee's perception of communication will be positively related to the employee's perception of goal achievement.

There is a significant, but moderately weak relationship between the employee's perception of communication and the employee's perception of goal achievement (rho =

0.466,  $p = 0.000$ ) (see Table 14). When team status was considered, the resulting relationship was stronger for non team-members ( $\rho = 0.538$ ,  $p = 0.000$ ) versus team members ( $\rho = 0.269$ ,  $p = 0.033$ ) (see Table 16). Most team members also reported high levels of communication. In conclusion, this hypothesis was supported with a significant result.

- Finding for Hypothesis H5e: The employee's perception of communication will be positively related to a general motivation to continuously improve.

The magnitude of the significant relationship between the employee's perception of communication and a general motivation to continuously improve was weak ( $\rho = 0.388$ ,  $p = 0.000$ ) (see Table 14). When team status was considered, the resulting relationship was stronger for non team-members ( $\rho = 0.469$ ,  $p = 0.000$ ) versus team members ( $\rho = 0.288$ ,  $p = 0.022$ ) (see Table 16). In conclusion, this hypothesis was partially supported with a stronger relationship for non team-members.

- Finding for Hypothesis H5f: The employee's perception of communication will be positively related to climate of continuous improvement.

There was a significant, but weak relationship between the employee's perception of communication and a climate of continuous improvement ( $\rho = 0.577$ ,  $p = 0.000$ ) (see Table 14). When team status was considered, the resulting relationship was significant for non team-members only ( $\rho = 0.881$ ,  $p = 0.000$ ) (see Table 16). In conclusion, this hypothesis was partially supported with a significant result for non team-members only.

H5g. The employee's perception of training will be positively related to the employee's perception of goal achievement.

NO SUPPORT

H5h. The employee's perception of training will be positively related to a motivation to continuously improve.

WEAK SUPPORT

H5i. The employee's perception of training will be positively related to climate of continuous improvement

WEAK SUPPORT

- Finding for Hypothesis H5g: The employee's perception of training will be positively related to the employee's perception of goal achievement.

There is no support for this hypothesis (see Table 14). Most employees reported high levels of goal achievement. This finding suggests that the quality and quantity of training may not be a determining factor in kaizen event success when the lean tools utilized are not difficult to comprehend. In most of the kaizen events in this study, the tools were not complex.

- Finding for Hypothesis H5h: The employee's perception of training will be positively related to a motivation to continuously improve.

There is a significant but weak relationship between the employee's perception of training and a motivation to continuously improve ( $\rho = 0.278$ ,  $p = 0.042$ ) (see Table 14). This finding suggests that training, however, may slightly impact a motivation to continuously improve.

- Finding for Hypothesis H5i: The employee's perception of training will be positively related to a climate of continuous improvement.

There is a significant but weak relationship between the employee's perception of training and a climate of continuous improvement ( $\rho = 0.279$ ,  $p = 0.041$ ) (see Table 14). Again, this finding suggests that training and a climate of continuous improvement are associated.

**Finding for Hypothesis H6: The employee's perception of participation in decision-making, communication, and training will be positively related to job satisfaction and commitment.**

Hypothesis H6 was rewritten as six separate hypotheses, H6a through H6f.

**Table 17. Hypothesis H6 Correlations**

	Spearman's Rho	Job Satisfaction	Commitment
PDM	Correlation Coefficient	.354(**)	.290(**)
	Sig. (2-tailed)	.000	.001
	N	129	130
Communication	Correlation Coefficient	.337(**)	.352(**)
	Sig. (2-tailed)	.000	.000
	N	129	130
Training	Correlation Coefficient	.260	.300(*)
	Sig. (2-tailed)	.060	.028
	N	53	54

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

H6a. The employee's perception of participation in decision-making will be positively related to job satisfaction.

WEAK SUPPORT: TEAM MEMBERS

WEAK SUPPORT: NON TEAM-MEMBERS

H6b. The employee's perception of participation in decision-making will be positively related to commitment.

NO SUPPORT: TEAM MEMBERS

WEAK SUPPORT: NON TEAM-MEMBERS

**Table 18. Hypotheses H6a and H6b Correlations**

PDM by	Spearman's Rho	Job Satisfaction	Commitment
Non Team-Members	Correlation Coefficient	.376(**)	.385(**)
	Sig. (2-tailed)	.002	.001
	N	66	66
Team Members	Correlation Coefficient	.391(**)	.186
	Sig. (2-tailed)	.002	.141
	N	63	64

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

- Finding for Hypothesis H6a: The employee's perception of participation in decision-making will be positively related to job satisfaction.

There was a significant, but weak relationship between the employee's perception of participation in decision-making and job satisfaction ( $\rho = 0.354$ ,  $p = 0.000$ ) (see Table 17). Team status did not moderate this relationship (see Table 18). There is weak support for this hypothesis.



- Finding for Hypothesis H6b: The employee's perception of participation in decision-making will be positively related to commitment.

There was a significant but weak relationship between the employee's perception of participation in decision-making and commitment for non team-members only ( $\rho = 0.385, p = 0.001$ ) (see Table 18). There is partial, but weak, support for this hypothesis.

H6c. The employee's perception of communication will be positively related to job satisfaction.

WEAK SUPPORT: TEAM MEMBERS

WEAK SUPPORT: NON TEAM-MEMBERS

H6d. The employee's perception of communication will be positively related to commitment.

WEAK SUPPORT: TEAM MEMBERS

MODERATE SUPPORT: NON TEAM-MEMBERS

**Table 19. Hypotheses H6c and H6d Correlations**

Communication by	Spearman's Rho	Job Satisfaction	Commitment
Non Team-Members	Correlation Coefficient	.329(**)	.427(**)
	Sig. (2-tailed)	.007	.000
	N	66	66
Team Members	Correlation Coefficient	.344(**)	.281(*)
	Sig. (2-tailed)	.002	.024
	N	63	64

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

- Finding for Hypothesis H6c: The employee's perception of communication will be positively related to job satisfaction.

There was a significant, but weak relationship between employee's perception of communication and job satisfaction ( $\rho = 0.337$ ,  $p = 0.000$ ) (See Table 17). Team status does not moderate this relationship. There is weak support for this hypothesis.

- Finding for Hypothesis H6d: The employee's perception of communication will be positively related to commitment.

There was a significant, but weak relationship between the employee's perception of communication and commitment ( $\rho = 0.352$ ,  $p = 0.000$ ) (see Table 17). Further investigation revealed that the relationship is stronger for non team-members ( $\rho = 0.427$ ,  $p = 0.000$ ) versus team members ( $\rho = 0.281$ ,  $p = 0.024$ ) (see Table 19). The team members reported high levels of communication in most cases. There is partial, but weak support for this hypothesis.

H6e. The employee's perception of training will be positively related to job satisfaction.

NO SUPPORT

H6f. The employee's perception of training will be positively related to commitment.

WEAK SUPPORT

- Finding for Hypothesis H6e: The employee's perception of training will be positively related to job satisfaction.

There is no support for this hypothesis (see Table 17).

- Finding for Hypothesis H6f: The employee's perception of training will be positively related to commitment.

There is a significant, but weak relationship between the employee's perception of training and commitment ( $\rho = 0.300$ ,  $p = 0.028$ ) (see Table 17).

**Finding for Hypothesis H7: Trust, job security, and respect for top management will be positively related to a perception of goal achievement, motivation to continuously improve, and a climate of continuous improvement.**

Hypothesis H7 was rewritten as nine separate hypotheses, H7a through H7i.

**Table 20. Hypothesis H7 Correlations**

Spearman's Rho		Goal Achievement	Motivation to CI	Climate of CI
Trust	Correlation Coefficient	.460(**)	.282(**)	.539(**)
	Sig. (2-tailed)	.000	.001	.000
	N	131	130	129
Job Security	Correlation Coefficient	.419(**)	.157	.360(**)
	Sig. (2-tailed)	.000	.074	.000
	N	130	130	128
Respect Mgmt	Correlation Coefficient	.377(**)	.302(**)	.462(**)
	Sig. (2-tailed)	.000	.000	.000
	N	131	130	129

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

H7a. Trust will be positively related to perception of goal achievement.

NO SUPPORT: TEAM MEMBERS

MODERATE SUPPORT: NON TEAM-MEMBERS

H7b. Trust will be positively related to a motivation to continuously improve.

NO SUPPORT: TEAM MEMBERS

MODERATE SUPPORT: NON TEAM-MEMBERS

H7c. Trust will be positively related to a climate of continuous improvement.

MODERATE SUPPORT: TEAM MEMBERS

MODERATE SUPPORT: NON TEAM-MEMBERS

**Table 21. Hypotheses H7a, H7b, and H7c Correlations**

Trust by	Spearman's Rho	Goal Achievement	Motivation to CI	Climate of CI
Non-Team Members	Correlation Coefficient	.598(**)	.450(**)	.556(**)
	Sig. (2-tailed)	.000	.000	.000
	N	69	68	66
Team Members	Correlation Coefficient	.189	.085	.536(**)
	Sig. (2-tailed)	.141	.512	.000
	N	62	62	63

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

- Finding for Hypothesis H7a: Trust will be positively related to a perception of goal achievement.

There is a significant, but moderate relationship between trust and a perception of goal achievement ( $\rho = 0.460$ ,  $p = 0.000$ ) (see Table 20). Further investigation revealed that the relationship is significant for non team-members only ( $\rho = 0.598$ ,  $p = 0.000$ ) (see Table 21). Again, most team members reported that the goal had been achieved independent of their trust level. There is partial moderate support for this hypothesis.

- Finding for Hypothesis H7b: Trust will be positively related to a motivation to continuously improve.

There is a significant, but weak relationship between trust and a motivation to continuously improve ( $\rho = 0.282$ ,  $p = 0.001$ ) (see Table 20). However, when team status is taken into account, the relationship is significant for non team-members only ( $\rho = 0.450$ ,  $p = 0.000$ ) (see Table 21).

- Finding for Hypothesis H7c: Trust will be positively related to a climate of continuous improvement.

There is a significant, but moderate, relationship between trust and a climate of continuous improvement ( $\rho = 0.539$ ,  $p = 0.000$ ) (see Table 20). Team status does not moderate this relationship. This hypothesis is moderately supported.

H7d. Job security will be positively related to a perception of goal achievement.

WEAK SUPPORT: TEAM MEMBERS

MODERATE SUPPORT: NON TEAM-MEMBERS

H7e. Job security will be positively related to a motivation to continuously improve.

NO SUPPORT: TEAM MEMBERS

WEAK SUPPORT: NON TEAM-MEMBERS

H7f. Job security will be positively related to a climate of continuous improvement.

WEAK SUPPORT: TEAM MEMBERS

WEAK SUPPORT: NON TEAM-MEMBERS

**Table 22. Hypotheses H7d, H7e, and H7f Correlations**

Job Security by	Spearman's Rho	Goal Achievement	Motivation to CI	Climate of CI
Non-Team Members	Correlation Coefficient	.452(**)	.305(*)	.376(**)
	Sig. (2-tailed)	.000	.012	.002
	N	69	68	66
Team Members	Correlation Coefficient	.255(*)	-.005	.266(*)
	Sig. (2-tailed)	.048	.968	.036
	N	61	62	62

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

- Finding for Hypothesis H7d: Job security will be positively related to a perception of goal achievement.

There is a significant, but moderate relationship between job security and a perception of goal achievement ( $\rho = 0.419$ ,  $p = 0.000$ ) (see Table 20). Further investigation revealed that the relationship is stronger for non team-members ( $\rho = 0.452$ ,  $p = 0.000$ ) versus team members ( $\rho = 0.255$ ,  $p = 0.048$ ) (see Table 22). There is partial support for this hypothesis.

- Finding for Hypothesis H7e: Job security will be positively related to a motivation to continuously improve.

There is a significant, but moderate relationship between job security and a motivation to continuously improve for non team-members only ( $\rho = 0.305$ ,  $p = 0.012$ ) (see Table 22). There is partial, but moderate support for this hypothesis.

- Finding for Hypothesis H7f: Job security will be positively related to a climate of continuous improvement.

There is a significant, but weak relationship between job security and a climate of continuous improvement ( $\rho = 0.360$ ,  $p = 0.000$ ) (see Table 20). Team status does not moderate this relationship. There is weak support for this hypothesis.

H7g. Respect for top management will be positively related to a perception of goal achievement.

NO SUPPORT: TEAM MEMBERS

MODERATE SUPPORT: NON TEAM-MEMBERS

H7h. Respect for top management will be positively related to a motivation to continuously improve.

WEAK SUPPORT: TEAM MEMBERS

WEAK SUPPORT: NON TEAM-MEMBERS

H7i. Respect for top management will be positively related to a climate of continuous improvement.

WEAK SUPPORT: TEAM MEMBERS

MODERATE SUPPORT: NON TEAM-MEMBERS

**Table 23. Hypotheses H7g, H7h, and H7i Correlations**

Respect for Top Management by	Spearman's Rho	Goal Achievement	Motivation to CI	Climate of CI
Non-Team Members	Correlation Coefficient	.559(**)	.376(**)	.555(**)
	Sig. (2-tailed)	.000	.000	.000
	N	69	66	66
Team Members	Correlation Coefficient	.007	.266(*)	.369(*)
	Sig. (2-tailed)	.955	.036	.003
	N	62	62	63

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

- Finding for Hypothesis H7g: Respect for top management will be positively related to a perception of goal achievement.

There is a significant, but weak relationship between respect for top management and a perception of goal achievement ( $\rho = 0.377$ ,  $p = 0.000$ ) (see Table 20). However, further investigation revealed that the relationship is significant for non team-members only ( $\rho = 0.559$ ,  $p = 0.000$ ) (see Table 23). This could be explained by the finding that most team members perceived that the goal had been achieved. While there was some variation in the performance gains it was tightly grouped. There is partial support for this hypothesis.

- Finding for Hypothesis H7h: Respect for top management will be positively related to a motivation to continuously improve.

There is a significant but weak relationship between respect for top management and a motivation to continuously improve ( $\rho = 0.302$ ,  $p = 0.000$ ) (see Table 20). This is an interesting finding that will be discussed later. Team status did not moderate this relationship. There is weak support for this hypothesis.

- Finding for Hypothesis H7i: Respect for top management will be positively related to a climate of continuous improvement.

There is a significant, but moderate relationship between respect for top management and a climate of continuous improvement ( $\rho = 0.462$ ,  $p = 0.000$ ) (see Table 20). Further investigation revealed that the relationship is stronger for non team-



members ( $\rho = 0.555$ ,  $p = 0.000$ ) versus team members ( $\rho = 0.369$ ,  $p = 0.003$ ) (see Table 23). This can again be explained by the fact that most team members believed there was a strong climate of continuous improvement, regardless of their respect for top management. These team members may have been selected to participate in the kaizen events because of this belief and their willingness to make change and look for new ideas. There was partial moderate support for this hypothesis.

### **Kaizen Event Performance/ Effectiveness**

This research examines the factors that attribute to successful outcomes in a kaizen event. Before analyzing the factors that lead to success, it is necessary to discuss how kaizen event performance or effectiveness is assessed. Declaring a kaizen event a success or failure is not as straightforward as one might think. Attainment of a pre-established, measurable goal is not the only notable outcome of a kaizen event. The performance and effectiveness of a kaizen event is the first topic to be examined in the qualitative analysis.

### **Purpose of a Kaizen Event and Outcomes**

Before considering the performance and effectiveness of a kaizen event, it is logical to address the purpose of a kaizen event. Typically, the purpose of a kaizen event is to improve a process within an organization and to measure this overall improvement. However, the interviews conducted in this research revealed that initiators of kaizen events often identify other desirable outcomes unrelated to the main process improvement goal. These tangential outcomes, such as increased knowledge sharing,

involvement, communication, lean education, accountability, eased relations, lean buy-in, and motivation to continuously improve, may not be immediately obvious and are often difficult to measure.

It can be argued that these aforementioned, intangible outcomes of kaizen events contribute to the overall lean climate of an organization. Some organizations recognize that the kaizen event may improve the overall lean climate by affecting these factors. In fact, there were some cases where management was primarily concerned with the beneficial impact of kaizen events on the lean climate and only secondarily concerned with attainment of the main process improvement goal. But for the most part, organizations did not outwardly identify these intangible outcomes as the reason for holding the kaizen event, but instead indicated these were welcome byproducts of the initiatives. There were quite a few organizations that identified the attainment of the measurable goal as the only purpose for having a kaizen event.

The following examples help illustrate the intangible outcomes identified by some of the participating organizations. At the wholesale distributor, the kaizen event was recognized as a communications tool and an educational opportunity. The president commented, "I don't think we've had one kaizen event where members didn't come out and say, 'I've learned something.'" When asked if the improvements could have been made without a kaizen event, the operations manager said, "They could have arrived at these solutions without the kaizen event, but the kaizen gets people involved, and understanding all sides. It's an educational tool as well as a communications tool." The president of the wholesale distributor felt the kaizen event created a process that would have made one worker who had been slacking off accountable for his actions for the first

time, so he left the organization. At the mattress manufacturer the operations manager also felt kaizen events provided an opportunity to get employees involved. When asked why the molding and tooling manufacturer began holding kaizen events, the general manager of the organization said, “Two reasons – engage the workforce and teach the tenets of lean manufacturing.” The manager at the molding and tooling manufacturer recognized the impact of the kaizen event on employees’ attitudes and lean buy-in. He also recognized empowerment, communication, and knowledge sharing as positive byproducts of kaizen events. The vice president of manufacturing at the ice cream manufacturer was equally focused on goal attainment, knowledge sharing, and communication during the kaizen event. One worker at the polyurethane manufacturer said that as a result of the kaizen events, he was more likely to make suggestions and had a better idea of the flow in the department.

Besides managers, team members and non team-members also recognized several of these outcomes, including knowledge sharing, eased relations, increased motivation to continuously improve, and overall positive lean impact as evidenced by their responses to survey items. About 70% of team members indicated that they had a better understanding of work outside of their job responsibilities as a result of the kaizen event and almost 80% of team members felt they had developed a closer relationship with each other. Approximately 64% of all individuals surveyed (including team members and non team-members) were more willing to look for improvements in their work as a result of the kaizen event. So, the kaizen events did have a positive impact on the motivation to continuously improve for more than half of those surveyed. However, more team members (about 76%) than non team-members (about 52%) believed the kaizen event

had brought the organization one step closer to becoming a truly lean organization. In fact, almost 18% of non team-members disagreed with this statement, but only about 2% of team members disagreed with the statement. More non team-members than team members believe that kaizen events do not impact the overall lean climate. Why is this? Perhaps, team members are more committed to the kaizen event initiative because of their direct involvement and therefore would rather believe that they are making a positive impact. Or, perhaps non team-members simply are not as versed in lean and therefore are unable to make such a broad statement accurately. This dichotomy between team members and non team-members needs is explored more throughout the chapter. In summary, the interview data revealed that most organizations believed the purpose of a kaizen event was to improve a measurable process, but the survey and interview data also suggested that there were other outcomes that often impacted the overall lean climate.

### **Success and Sustainability**

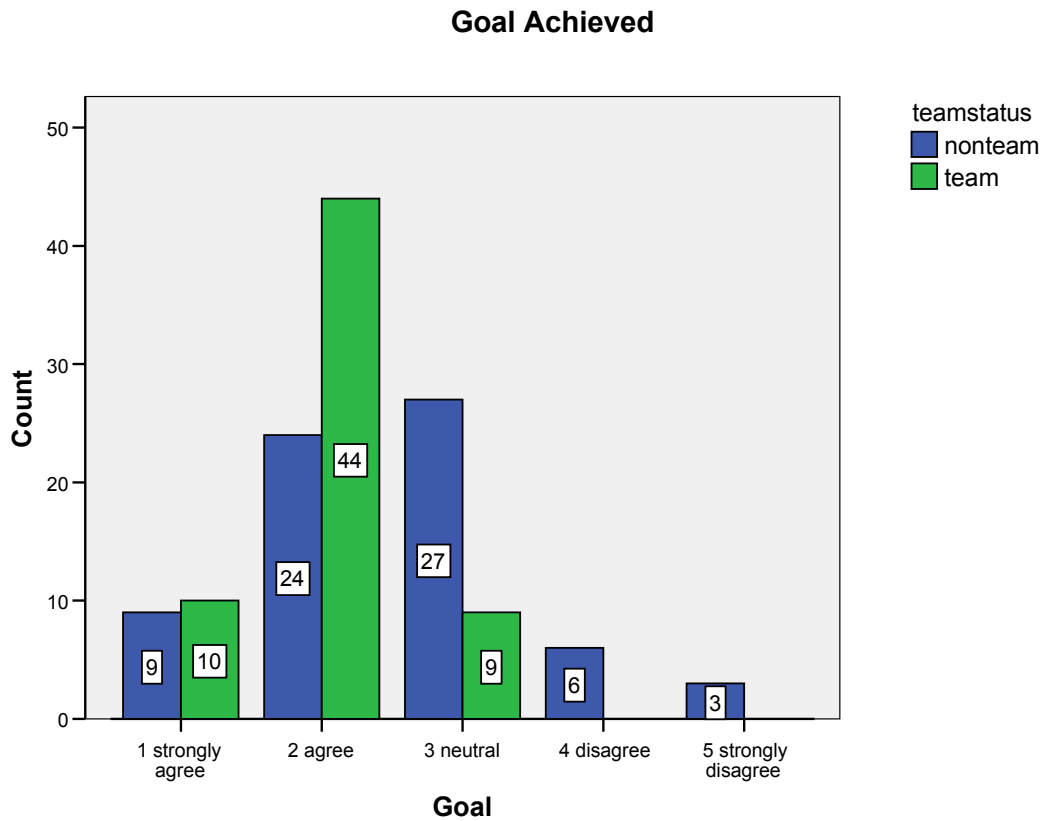
When contemplating what works, what doesn't, and why in a kaizen event, it is important to address how to measure the success or effectiveness of a kaizen event. Most organizations measure the success of a kaizen event by comparing the actual process improvement with a pre-established process improvement goal.

### **Goal Achievement**

Based on interviews with managers at the eleven organizations, all but two indicated that the goals of the kaizen event had been achieved. Figure 11 captures the

individual responses to the item on the survey that read, "The improvement goal of the kaizen event was achieved." Over 85% of team members agreed that the kaizen event had achieved its goal, but only 47.8% of non team-members felt that the kaizen event had achieved its goal. In fact, almost 8% of non team-members disagreed with the statement. When looking at the data gathered from the team-member surveys, it can be seen that no team-member disagreed with the statement. Almost 40% of non team-members responded neutrally to the statement, suggesting that many non team-members simply were not sure if the kaizen event had reached its goals. Although the managers at two organizations believed the kaizen event had not achieved its goals, the team members did not indicate a similar sentiment in the survey.

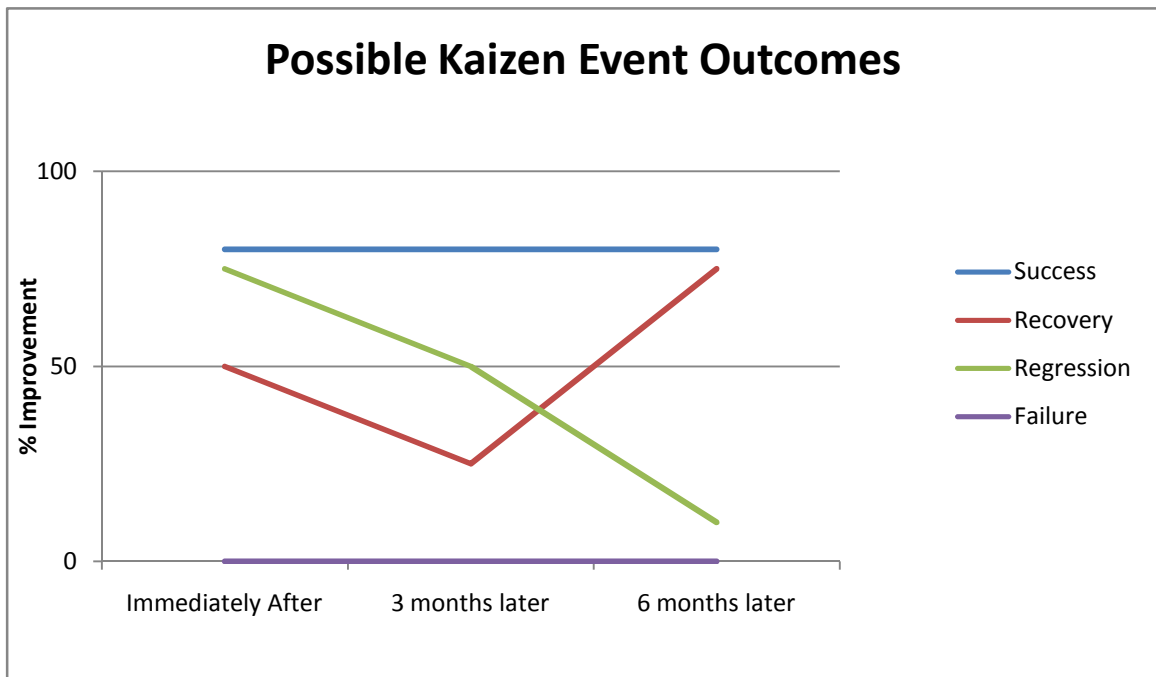
Figure 11. Goal Achievement



Many different measurable outcomes are possible as a result of running a kaizen event. Figure 12 depicts only four of the many different outcomes of a kaizen event. This graph illustrates how an event could be deemed a complete success. In this scenario, the kaizen event is perceived to have reached all its pre-established goals immediately following the event and these results have sustained several months after the completion date. In the second scenario, deemed the regression, the event could also have resulted in an initial degree of success, determined by a percentage of improvement compared to the initial state, and then regressed over time. According to the managers interviewed, the percentage of improvements that experience backsliding was between

thirty and fifty percent. In the third scenario labeled recovery, there may be an initial improvement followed by more improvements over time. In the fourth scenario called failure, the kaizen event could have been deemed a failure with no improvement recorded whatsoever, or even possibly a reduction in performance. In some instances, the improvement may be no longer measurable because the targeted area may have been modified due to product/process design changes or product demand changes, in which case the kaizen event may be ruled neither a success nor a failure.

**Figure 12. Kaizen Event Outcomes**



When discussing outcomes of a kaizen event, it is also important to address the metric used to measure the process improvement. These metrics may include level of inventory, profit, scrap, rework, and 5S audit scores, to name a few. Following the

kaizen event, some participating organizations tracked the process improvements at set intervals of time to determine if the implemented changes had been sustained. In summary, kaizen event success is typically measured by attainment and sustaining of a measurable goal.

All the organizations in the study assessed the success of a kaizen event based on attainment of a pre-established goal, but a few organizations were also interested in the kaizen event team members' perceptions of the outcomes and the lean training. This survey data, collected after the kaizen event, was used to improve the existing kaizen event process. However, no organizations attempted to gather feedback from non team-members impacted by the kaizen event changes. The organizations that gathered feedback from team members focused more on improving the kaizen event process. Companies that were aware of a kaizen event's potential impact on the lean climate were more likely to design a kaizen event process with a high level of employee involvement that positively impacted the lean climate. Organizations that designed kaizen events with an interest in the goal as well as the process and its impact on the lean climate were more likely to achieve sustainable improvements than organizations that focused solely on goal achievement.

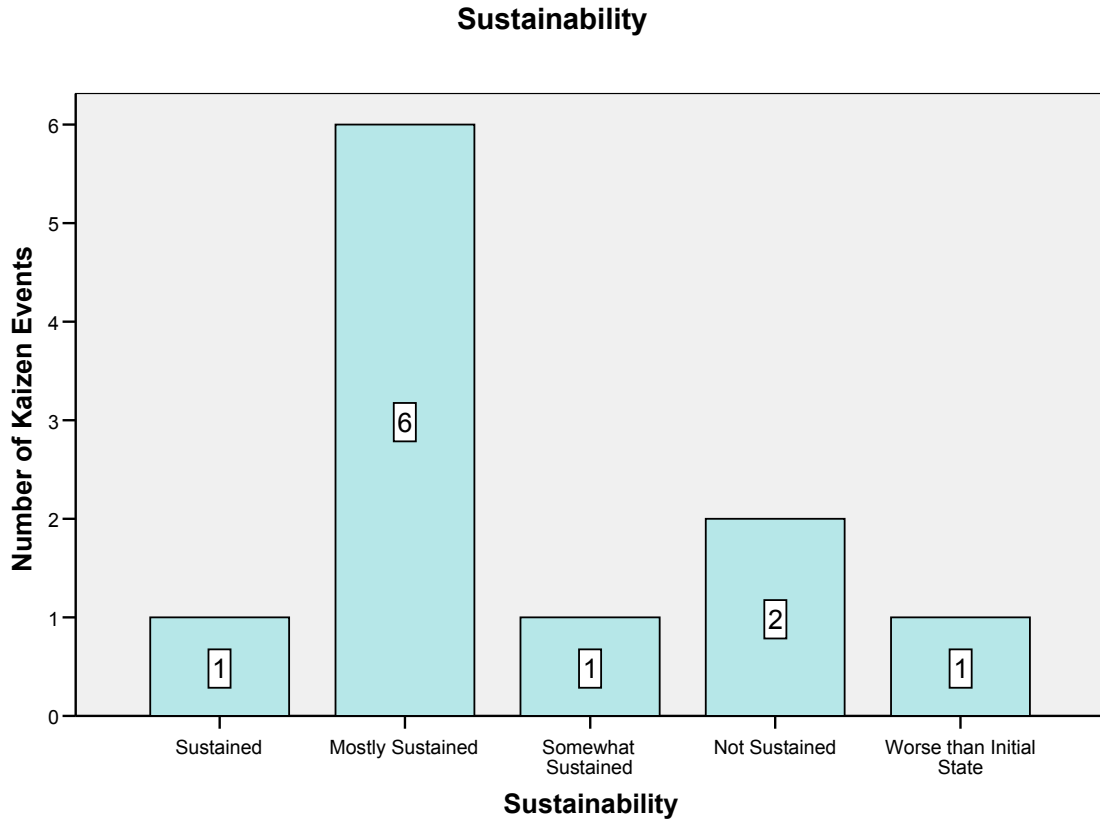
### **Non Team-Member Assessment of the Outcomes**

In most, if not all, of the organizations that participated in this study, there was not an organizational method to assess the kaizen event outcomes from the perspective of the non team-members that worked in the area where the changes had been instituted. This study, however, did consider the outcomes from the perspective of the non team-



members. 26.5% of non team-members felt their job responsibilities had changed a great deal as a result of the kaizen event. 18.8% of non team-members felt their daily workload was much greater. 31.9% of non team-members felt the kaizen event had streamlined their work, while 39% disagreed with this statement. At seven of the eleven participating organizations, more than 50% of the non team-members disagreed with the statement that the kaizen event had streamlined their work. 50.7% of non team-members felt the kaizen event had impacted their job positively, but at two companies, no team members agreed with this statement.

**Figure 13. Number of Kaizen Events Sustained**



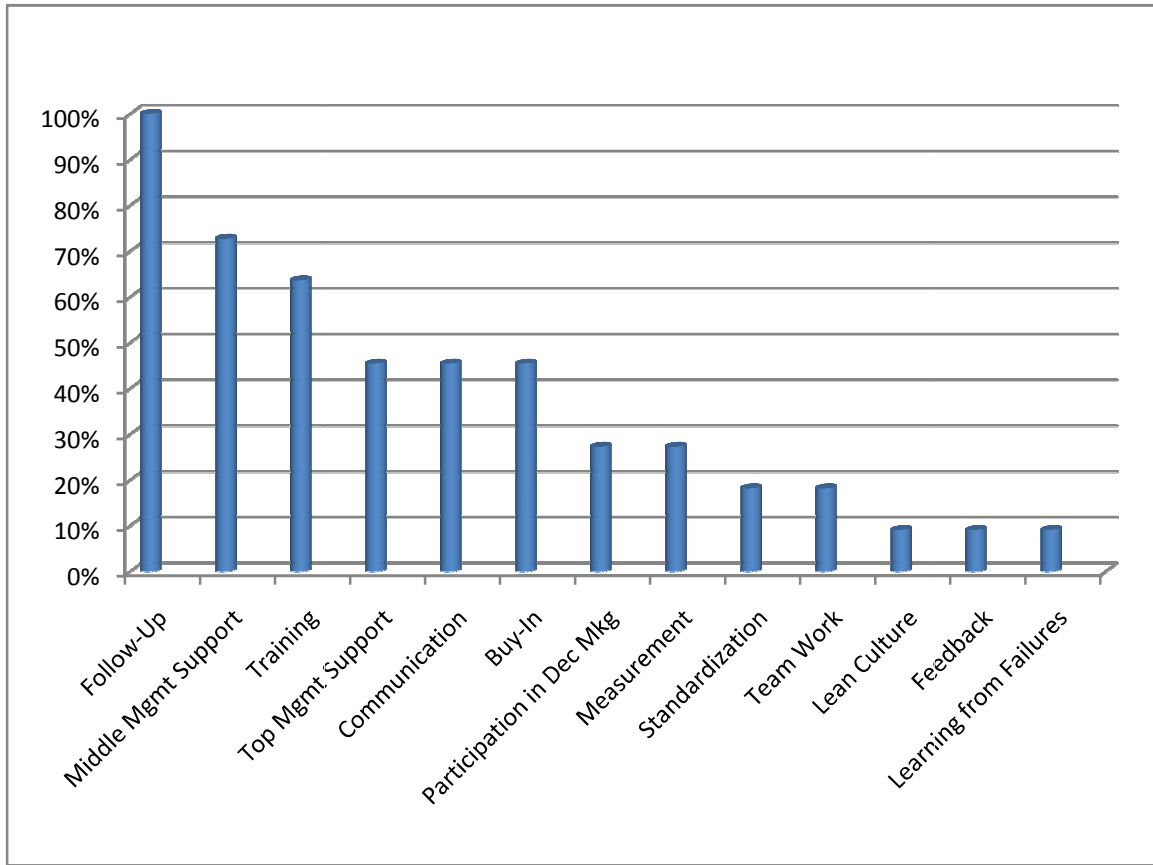
### **Managers' Opinions of Factors in Sustainability**

In this study, the changes implemented in three out of 11, or 27%, of the kaizen events did not sustain (see Figure 13). The managers' interviewed reported similar findings indicating that 30 to 50% of kaizen events backslide. When managers were asked during the interviews what makes kaizen events sustainable, they identified a variety of reasons. Managers and facilitators at all but two of the organizations considered the kaizen event to be a success. The reasons are outlined in the Figure 14,

with the most common reasons (i.e. the largest percentage of managers that mentioned the same key factor) listed first.

All eleven participating organizations indicated that kaizen event improvements were more likely to be sustained if there were follow-up audits after the event. More than 70% of the participating organizations indicated that middle management behavior played a key role in the success and sustaining of process improvements. Training was cited as a key ingredient in the recipe for kaizen event success and sustaining of improvements at more than 60% of the participating organizations. As in most change initiatives, top management support was flagged in more than 40% of the cases as an essential determinant of kaizen event success. More than 40% of the companies indicated that communication breakdowns negatively impacted the success and sustaining of kaizen events. In excess of 40% of the organizations felt cooperation and buy-in to the lean effort were required to hold a successful kaizen event. More than 25% of the managers interviewed expressed participation in decision-making as an ingredient necessary for a successful kaizen event. Measurement was also cited more than 25% of the time as a key to success. Several factors were described as keys to successful kaizen events in less than 20% of the cases. These factors included, standardization, team work, lean culture, feedback, and learning from failures.

**Figure 14. Kaizen Event Success Factors**



**Involvement Variables**

**Involvement Variable #1: Participation in Decision-Making**

Key finding: When non team-members participated in decision-making during the kaizen event the non team-members reported more successful, sustainable improvements. Team-member participation was high in both successful and unsuccessful kaizen events. Non team-member participation in decision-making is a key to a successful outcome and

yet more than 50% of the organizations failed to involve all the non-team members who would be impacted by the kaizen event changes.

Participation in decision-making is the first involvement variable that will be discussed. It was hypothesized that participation in decision-making at the organizational level would be positively related to kaizen event performance gains, sustainability, and a climate of continuous improvement. Each of these hypotheses (H1a, H1b, and H1c) was tested using correlations analysis and received partial support. There was a significant relationship for non team-members only. In other words, the level of participation in decision-making was not significantly related to performance gains, sustainability, and a climate of continuous improvement for team members. Perhaps, just by serving as a team-member in a kaizen event, an employee feels involved in the decision-making process regardless of his or her actual level of participation. More than 90% of the team members reported that their input in the kaizen event had a positive impact on the outcomes.

Similarly, the hypotheses H5a, H5b, and H5c, developed at the employee level between participation in decision-making and perceived goal achievement, and a climate of continuous improvement received partial support. Participation in decision-making was found to have a significant relationship with goal achievement and a climate of continuous improvement for non team-members only. Interestingly, participation in decision-making for a single kaizen event was not significantly correlated with a general motivation to continuously improve. In other words, the team members and non team-members motivation to improve as a result of the kaizen event was independent of their level of participation in decision-making in the kaizen event. More than 66% of team

members and 62% of non team-members reported that they were more willing to look for possible improvements in their work as a result of the kaizen event. This suggests that the greater motivation to continuously improve resulted directly from the kaizen event and it was not necessarily dependent on the level of participation in decision-making. It seems that it would make sense to hold kaizen events simply for this added benefit. By holding a kaizen event, management may be sending a message to its employees that improvements are welcomed.

The level and breadth of participation by the team members during the report-out was considered in the interview and observation sessions. Of 64 participating team members, 62 agreed or strongly agreed with the survey statement, "I often gave my input during the kaizen event." Only two respondents selected 'neutral.' Interestingly, in five of the cases, team members disagreed with the survey item, "Members of the organization encouraged me to participate in decision-making during the kaizen event," but these same individuals reported that they gave their input during the kaizen event. This provides further evidence that simply serving as a team-member promotes participation in decision-making regardless of the level of encouragement. Four out of five of these team members that felt they were not encouraged to participate in the decision-making did, however, disagree with the statement, "I would have participated more in the decision-making, if I felt my input was truly valued." So, it seems that if the participant was a team-member, it did not matter if the individual was encouraged to participate or that person felt his or her input was valued, the individual gave input regardless.

In a couple of kaizen events, I observed less participation than was actually reported by the team members. So, it seems that participation as a team-member gave the participants' the feeling of involvement regardless of the actual level of participation in decision-making. In fact, in 25% of the organizations, the final presentation was made by a single individual instead of all the team members.

For example, at the wholesale distributor, one team-member participated considerably more than the others because of familiarity with the process. The development of solutions was split between this individual and the facilitator. The facilitator developed the entire presentation on his own and the president transferred the presentation to electronic form. Contrary to some of the low participation levels observed by the researcher, all the team members at the wholesale distributor reported high levels of participation in decision-making. Perhaps some of the employees had never experienced the empowerment that goes along with strong participation in decision-making and therefore did not have high expectations. Maybe *any* level of participation was perceived as a considerable level of participation.

Non team-member involvement was addressed in the survey as well as during the follow-up interviews with non team-members. Almost 35%, or 22 out of 69, of the non team-members disagreed with the item "I made suggestions to the team during the kaizen event." Almost 40%, or 25 out of 69, of the non team-members disagreed with the item, "Members of the kaizen event team asked for my input during the kaizen event." 24 out of 69 of the non team-members, or more than 35%, agreed with the item, "I would have made more suggestions to the kaizen event team, if I felt my input was truly valued." About 20% of the non team-members felt the improvements were limited because there

were details about the work that the team did not consider. At seven of the eleven companies, at least one employee reported this sentiment.

For the most part, the participating organizations asked for input or suggestions from some, but not all, of the non team-members that worked in the targeted areas. This limited involvement was evident at the wholesale distributor, the defense contractor, the container manufacturer, the ice cream manufacturer, the metal laminate supplier, the precision tool manufacturer and the second defense contractor. Management at the defense contractor commented that lack of non team-member involvement in the kaizen event becomes even more problematic when the team members do solicit advice or suggestions from non team-members and then that advice is not taken into consideration. Most organizations recognized the need for involvement from non team-members, but acknowledged their lack of commitment to including the non team-members in the decision-making. Several non team-members noted examples of situations where they were not included in the decisions during the kaizen events and the negative impact this had on sustainability and limited future improvements to the process. An employee at the container manufacturer referred to a previous event where, “They (the kaizen event team members) weren’t successful and they didn’t involve us, so it got changed to the way the workers felt it was better.” Another employee had ideas, but didn’t know how to submit them. The idea submission process was not clear to this employee. The mattress manufacturer failed to include the second shift during the kaizen event and as a result, had trouble maintaining the changes.

At the ice cream manufacturer, one supervisor acknowledged that non team-members made suggestions to further improve the targeted process following the kaizen



event, but the supervisor made the decision that it would be best to just keep the process as it was. During the interviews at the ice cream manufacturer, some non team-members indicated that management did not always include all the non team-members impacted by the changes. The consultant at the precision tool manufacturer acknowledged the importance of participation in decision-making by non team-members, "If we go ahead and force it (the changes) on them, it doesn't stick as well." One manager at the precision tool manufacturer recalled an event where there was little to no involvement from the workers in the targeted area. "We moved stuff out without notifying people and they didn't like it," he recalled. The lean coordinator concurred, "I think it sustains better if it's theirs [the employees' ideas] all the way and it's small." According to the plant manager at the second defense contractor, involving the employees affected by the kaizen event during the kaizen process is the only way to get the changes implemented and to get buy-in. One employee at the defense contractor wished that the team members had included him more in the decision-making process. "If you just include the people in there it's better. They're probably the experts, the ones that do it on an every-day basis. I believe that people are going to try to develop a system to get their job done quicker and easier."

Non-involvement occurred at the managerial level at one corporation. There was a corporate kaizen event held at headquarters involving operations managers from only a small percentage of divisions. During this kaizen event, a divisional process was targeted and changed without input from divisional managers. Following this corporate event, the individual divisions were directed to implement a one-piece flow layout that was

developed during the event. The operations manager indicated that the changes had resulted in "complete chaos" and lower levels of overall morale.

A lean team-member from the first defense contractor mentioned that perhaps the importance of involvement has not been communicated to non team-members effectively. At this point, she brought up the fact that the lean group does not actually collect evaluations from the people that are not on the team. The only feedback that they collect comes directly from the kaizen event team members. The defense contractor's participation in this study has encouraged management to consider gathering feedback from the people not on the team following the kaizen event. It is a piece that they feel is missing from their kaizen event process. They realized that the people on the kaizen event team were pleased with the kaizen event results, but the workers in the area felt the kaizen event was a failure. A worker from the first defense contractor expressed his concerns, "They didn't ask me questions during the kaizen, just in passing. Because I was working in there, I wish I was more involved."

### **Involvement Variable #2: Communication**

Key finding: Pre-kaizen event communications tend to occur more frequently for team members versus non team-members. This research found that failure to communicate effectively with non team-members about the kaizen event's details prior to the kaizen event may negatively impact performance gains, sustainability, and a climate of continuous improvement.

The second involvement variable that will be discussed is communication. The survey addressed the communications that occur prior to the start of the kaizen event.

These pre-kaizen event communications might include the reason for having a kaizen event, the date and the duration of the event, the expected role of the employee, the impact on job responsibilities, and the goal of the kaizen event. It was hypothesized at the organizational level that communication would be related to performance gains, sustainability, and a climate of continuous improvement. Hypotheses H1d, H1e, and H1f received support for non team-members only. The hypotheses received no support when considering only team members. This surprising finding may be attributed to the idea that the majority of team members reported high levels of communication. It is plausible that the team members were kept abreast of the kaizen event happenings because of their particularly prominent role in the kaizen event. However, it was a different scenario for non team-members. Not all team members were informed of the details regarding the upcoming kaizen event. As a result, there were reportedly negative consequences associated with poor communication.

The hypotheses at the individual level, H5d, H5e, and 5f, were tested and similar results were obtained. There was a moderate relationship between communication and goal achievement and communication and the motivation to continuously improve, but the relationship was stronger for non team-members. Communication was related to a climate of continuous improvement for non team-members only. Again, these surprising findings aren't so surprising after all, for the team members all reported positive views on communication limiting the variability of the responses and identification of a significant correlation. Based on the findings from the interviews, most organizations made the employees aware of the timing of the kaizen event anywhere from one week to two months before the event, but only a handful took the time to explain the purpose and the

expectations to workers. Some organizations met with employees in an effort to garner buy-in from the workers. One company spent time prior to the kaizen event communicating previous kaizen event successes hoping to promote cooperation from workers in the targeted area.

Communications with non team-members during and after the kaizen event also played a part in the success and sustainability of kaizen events as discovered in interviews. At more than 40% of the companies, managers interviewed indicated that communication breakdowns negatively impacted the success and sustainability of kaizen events. These communications sometimes included explanations of the benefits of the changes and possibly the continuous improvement expectations from each employee. Workers may be concerned that changes resulting from a kaizen event could lead to a heavier workload. Almost 20% of non team-members interviewed indicated that their daily workload was indeed greater following the kaizen event. To ease the transition, some organizations specifically met with non team-members following the event to discuss the benefits associated with the changes in their job. The survey showed that more than 25% of the non team-members felt that their job responsibilities had changed a great deal.

There were several examples where kaizen event changes were not explained and to employees working off-shifts and this was identified by management as one of the main reasons for a kaizen event's failure. Follow-up communications with workers in the targeted area often included non-verbal signage with audit scores detailing the status of the change. Internal company-wide newsletters were used in several cases to share the lean successes with the rest of the work community. Communication breakdowns could

occur at any of the levels previously discussed, and in most cases, if the information was not appropriately conveyed to non team-members there was a higher rate of failure and less employee buy-in or cooperation.

Finally, the communications that occurred during the kaizen event may foster information sharing amongst the team members. 70.3% of team members were in agreement with the survey item that read, "As a result of this kaizen event, I have a better understanding of work outside of my job responsibilities." In addition, almost 80% of the team members reported closer relationships and a sense of "bonding" with teammates. This level of communication represents a potential beneficial outcome of a kaizen event.

### **Involvement Variable #3: Training**

Key finding: During most of the studied kaizen events, minimal training took place. The majority of training was related to broad, basic lean concepts conducted prior to the event. The type of training seemed to have no impact on the success and sustainability of the kaizen events since the improvements were fairly straightforward.

Interviewed managers cited training as a key component of kaizen event success and sustaining at more than 60% of the participating organizations. Several different types of training were presented, including basic lean training to familiarize employees with the tenants of lean manufacturing, training dedicated to lean cultural factors, training related to the specific lean tool to be utilized during the kaizen event, training with the workers in the targeted area following the event to incorporate the resulting changes, and training for the supervisors related to sustaining the improvements resulting from the kaizen event and the process of frontline worker idea generation. Training

potentially occurs before the kaizen event, at the beginning of the kaizen event, and/or at the end of the kaizen event. Both, the team members and non team-members may receive training at some point in time. It was hypothesized (hypotheses H1g, H1h, and H1i) at the organizational level that training would be positively related to performance gains, sustainability, and a climate of continuous improvement. None of these hypotheses were supported, but this could be explained by the overwhelming positive responses made by the team members with regards to the quality of the training. Also, most kaizen events studied were relatively straight-forward and addressed basic process improvements or 5S efforts. In addition, it was hypothesized at the individual level that training would be related to goal achievement, a motivation to continuously improve, and a climate of continuous improvement. There was no support for the relationship between training and the goal achievement. This is most easily explained by the lack of variability in the responses made by the team members with regard to training. Very weak support was found for both the motivation to continuously improve and training, and the climate of continuous improvement and training.

Although most managers agreed that training was critical to kaizen event success, the amount and quality of lean training varied considerably from organization to organization. Most of the organizations that hired outside consultants to facilitate the kaizen event relied on the training to be conducted by the consultants. In some situations, general lean training took place in company wide initiatives to introduce lean principles to the workforce. Grant money allowed for this training to be funded to some degree, for it paid for the labor required to replace those individuals that were removed from their duties to participate in training. In several organizations there was an effort to 'train the

trainers' to make it possible to implement lean efforts without having to hire outside consultants.

Basic lean training was provided at all but one of the organizations to either managers only or a portion of the entire workforce. Almost half of the organizations offered this basic training using grant money intended for that purpose. In all but two of the organizations an outside consultant was hired to teach the lean basics, and in over 40% of the cases this training was provided by the Massachusetts Manufacturing Extension Partnership (i.e. MassMEP), which is a staff of lean trainers linked to the U.S. Department of Commerce and the National Institute of Standards and Technology (NIST). Managers in some organizations received lean certification following training provided through MassMEP. One organization was looking to collaborate with a local college to hold quality related courses at the plant giving employees the opportunity to receive earn certificates which in turn would result in pay increases and/or possible promotions.

Lean basic training was often presented in separate modules and consisted of topics such as lean awareness training, visual management training, layout programs, cell manufacturing, kaizen events, English as a Second Language training, Lean Basics, TWI (Training Within Industries) to name a few. The duration of these sessions varied considerably. For example, the basic lean introduction course or Lean 101 provided by MassMEP was an eight hour training session and Training Within Industries (TWI) was a 10 hour program broken up into five, two hour sessions.

Besides basic lean education, some organizations provided training during the kaizen event dedicated solely to the lean tool to be used. The level of complexity of the

tools used during the kaizen event varied from basic to slightly complex. Most organizations provided quick lean overviews during the kaizen event and focused on process improvement identified while mapping out the process. Most organizations had only conducted kaizen events dedicated to process improvements or 5S efforts. Only four of the 11 participating organizations had conducted kaizen events dedicated to set-up reduction and kanban implementation using slightly more complex lean tools such as cause diagrams, value stream mapping, and fish bone diagrams to improve the process flow. Perhaps the quality and quantity of lean training would have more of an impact on the kaizen event performance in instances where the lean tools utilized are more complex. The level of training did not seem to affect the outcome in situations where basic process improvements were the kaizen event objective.

Only one of the eleven organizations had an extensive training program dedicated to kaizen event lean tools that was developed in house. This organization had a variety of PowerPoint training modules dedicated to different lean tools and topics. During a kaizen event, the appropriate module was presented the first day. These training modules, which incorporated years of research, were considered intellectual property and not shared with outsiders. Interestingly this organization did seem to have the technicalities of the kaizen event process ironed out, but still failed to include the non team-members effectively during the kaizen event. In addition, this organization did not gather feedback from non team-members following the kaizen event. So, it seems that even though they are well-versed in lean tools, they lost sight of all the key stakeholders in the kaizen event.



Many organizations began lean training as a result of receiving grant money through the state. Others used the funding to help finance an already existing lean effort. In situations where there were questionable levels of top management support for the lean effort few sustainable improvements were made in kaizen events. In a couple instances, the lean programs were abandoned once the monies obtained through grants were depleted.

### **Structural Considerations for a Kaizen Event**

#### **The Facilitator's Role**

Key finding: At the beginning stages of lean implementation, companies often hire outside consultants to facilitate kaizen events. Most managers agreed that inside facilitation was preferable. A facilitator's participation in decision-making was negatively correlated to team-member participation in decision-making, a climate of continuous improvement, the attainment of the goal and the team-member's satisfaction with the kaizen event. Facilitators were more likely to be involved with the decision-making in instances when the scope of the kaizen event was deemed too large for a kaizen event.

When planning a kaizen event, it is customary to select a facilitator to oversee the day-to-day team activities. The facilitator is often responsible for setting the daily schedule and ensuring that the team stays on track. Often, the facilitator acts as a mediator and sometimes needs to use conflict resolution tactics. This research explored several aspects of the facilitation process. Two aspects of the facilitator selection process prior to the kaizen event were considered. When choosing a facilitator, an organization

must decide whether to use an internal facilitator or an outside facilitator. In addition, the desired level of expertise needs to be considered during the selection process. This section will discuss both the facilitator selection process decisions made prior to the kaizen event and the level of facilitator participation in decision-making during the kaizen event.

### **Internal versus External Facilitators**

Five out of the eleven participating organizations hired outside consultants to facilitate their kaizen events. Interestingly, four of the five companies using outside consultants expressed a desire to use internal facilitators in the future. Understandably, the decision to hire an outside or external facilitator was often dependent on a company's experience with previous kaizen events. The survey results indicated that the companies with internal facilitators had conducted an average of 59.4 kaizen events in the past and the companies with external facilitators had conducted an average of 12.67 kaizen events in the past (Table 24 includes the t-test used to compare the means). Although the t-test indicated that there was not a significant difference between the means of the number of previous kaizen events and the status of the facilitator ( $t = 2.405$ ,  $p = .068$ ) it was worth exploring this relationship. The difference in the means may suggest that organizations in the beginning stages of implementing lean have fewer employees with the necessary experience and expertise to facilitate a kaizen event, and therefore look to hire outside consultants to run the kaizen events. Outside consultants were often identified by organizations through MassMEP connections or using consultants hired through Western Massachusetts Electric Company (WMECO).

At the one company that planned to use an outside consultant as a facilitator indefinitely, most employees agreed that an outside facilitator was the best choice. It is important to note that this was the smallest organization to participate in the study. Perhaps because of the company's small size the strong, close relationships amongst employees made it difficult for management to select an internal facilitator that could be truly objective. One team-member commented, "I think an outside objective person can get light bulbs going off leading you down different areas. Someone from outside gets people thinking more." Another employee said, "I like the outside consultant. He's not too close to the situation. You're not worried about stepping on anyone's toes."

However, as previously stated, the majority of the participating organizations preferred using an internal facilitator whenever possible. Several of these organizations had begun training facilitators internally. According to the lean coordinator at the precision tool manufacturer, the company plans to switch to an internal facilitator in the next few months. He believes, "An inside facilitator is better than an outside facilitator. They [the internal facilitators and employees] think it's our ballgame." The tool and die manufacturer initially had outside consultants facilitating the kaizen events, but then appointed a lean coordinator to conduct kaizen events. The current lean coordinator felt the consultant spent too much time facilitating from the conference room, and not enough time on the plant floor with the people. The defense contractor has an extensive corporate-based program designed to train facilitators internally. The container manufacturer currently has a Kaizen Promotion Office (KPO) with four lean representatives that serve as facilitators and lean coordinators. At the metal laminate supplier all the events have been facilitated by the production manager. He has

significant experience facilitating kaizen events from a previous job at MassMEP. One interviewed employee seemed frustrated with management's choice to hire an outside consultant to do the facilitating. One manager at the ice cream manufacturer said, "I don't feel that we have to have an outside person come in and talk to us about how to solve a problem. I don't think an outside consultant has to come in and coach us through. I understand there has to be a leader, a coach, but I don't think it has to come from the outside. He didn't come up with all that stuff."

The size of the organization did seem to play a role in an organization's choice to use an outside consultant, but for the most part, it seemed that internal facilitators were preferable. A number of reasons contributed to the choice of internal facilitation. First, an internal facilitator was more familiar with the process and with the employees in the company. Second, an inside facilitator was less likely to be overly concerned with management's approval of the direction and outcomes of the kaizen event. Finally, using an internal facilitator was empowering and promoted employee involvement.

**Table 24. Comparison of Previous Kaizen Events by Internal/External Facilitator**

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Prevkaizens	Equal variances assumed	7.859	.021	2.633	9	.027
	Equal variances not assumed			2.405	4.404	.068

### **The Impact of the Facilitator's Level of Expertise on Performance Gains**

It was hypothesized that the facilitator's level of expertise would be positively related to performance gains (Hypothesis H2). Surprisingly, there was no support for this hypothesis. However, the lack of a correlation between the two variables is understandable given that the facilitator's level of expertise was similar in most organizations with little variation. If some of the organizations in the study had facilitators with little to no experience, a significant relationship between experience and performance may have been identified, but the lack of variability in the measure resulted in a non-significant correlation. In addition, the complexity of the lean tool utilized during the kaizen event may have mediated the relationship between the level of expertise and the performance gains. The tools utilized in the majority of the kaizen events were fairly straightforward and therefore the facilitator's level of expertise may have not truly mattered. If the tools employed were more complex, the facilitator's level of expertise may have impacted the kaizen event's success.

### **The Degree of Facilitator Participation in Decision-Making During the Kaizen Event**

In some instances the facilitator simply acted as a mediator and allowed the team members to arrive at the solutions, but in other cases the facilitator acted as an active participant and made decisions with respect to kaizen event outcomes. Although, it was generally agreed upon by managers that the facilitators were not there to be an active participant in the decision-making during the problem-solving stages of the kaizen event, interview data found varying levels of involvement by the facilitator. 9.4% of team

members surveyed reported that the facilitator came up with most of the ideas used in the proposed improvements. Facilitator involvement in the decision-making was negatively correlated with the team-member's perception of individual participation in decision-making ( $\rho = -.463$ ,  $p = .000$ ). Although, this data does not suggest a cause-effect relationship, the motivation to participate in decision-making could be quashed in scenarios where the facilitator is making a large percentage of the decisions. Significant correlations with other variables are listed in Table 25 below. Most are weak in magnitude, but some are worth mentioning. Facilitator involvement in decision-making is negatively correlated with a climate of continuous improvement, the attainment of the goal and the team-member's satisfaction with kaizen event. Interestingly, facilitator involvement is significantly correlated with the scope of the kaizen event. The same team members that reported kaizen event scopes that were too large, reported high levels of facilitator participation in decision-making. This suggests that facilitators may have been more compelled to actively participate in the idea generation and decision-making when kaizen events were more broad and complex.

**Table 25. Facilitator Participation in Decision-Making Correlations**

	Spearman's Rho	PDM	CIavg	Goal	Scope	Satisfaction
Facilitator PDM	Correlation Coefficient	-.463(**)	-.353(**)	-.283(*)	.313(*)	-.304(*)
	Sig. (2-tailed)	.000	.004	.024	.012	.015
	N	64	64	63	64	64

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

Although the managers at the wholesale distributor indicated that they would like the decisions to be made ultimately by the team members without significant involvement by the outside facilitator, some of the team members felt differently. One employee said, “You need someone out of the organization to facilitate, because you get different ideas from him as well.” Interestingly, the facilitator in this organization offered suggestions, whereas in other companies, facilitators were not typically active participants. During the report-out at this small company, the outside consultant, as opposed to the team members, delivered most of the presentation. One of the team members commented, “I think that his opinion would be valued more because he has been a kaizen facilitator for so many years. Because he is from outside and doesn’t work here there wouldn’t be this sense of a non-management person suggesting to management how to do their jobs.” By hiring an outside consultant who actively participates in the event with suggestions and decisions, it seems management is sending the message that the consultant's ideas are more valuable than the team members. Based on their comments, the team members seemed to accept this belief.

### **Duration and Scope of a Kaizen Event**

Key finding: The duration of a kaizen event may not always provide ample time to address the targeted improvement opportunity. Managerial intervention and/or redirection as well as facilitator involvement in participation in decision-making were more likely to occur in situations where team members felt the kaizen event was too short. Kaizen events should be selected based on careful consideration of the projected

topic. Not only may a kaizen event not reach its full potential if the scope is too broad or complex, but the climate of continuous improvement could be negatively impacted and the morale decreased.

## **Duration**

**Table 26. Kaizen Event Duration Correlations for Team Members**

Spearman's Rho		Training	PDM	Commavg	Scope	Redirect	Facilitator
Duration	Correlation Coefficient	-.305(*)	-.445(**)	-.407(**)	.409(**)	.271(*)	.285(*)
	Sig. (2-tailed)	.025	.000	.001	.001	.032	.022
	N	54	64	64	64	63	64

\* Correlation is significant at the 0.05 level (2-tailed).

\*\* Correlation is significant at the 0.01 level (2-tailed).

The duration of the kaizen event and its relationship with other kaizen event factors were considered. 42.2% of team members agreed with the statement, "If we had more time, our kaizen event team would have been able to make better recommendations." The correlation matrix listed in Table 26 suggests that there are some weak but significant correlations between this item reflecting the duration of the kaizen event and other variables. For example, the duration item was negatively correlated with participation in decision-making (rho = -0.445, p = 0.000), communication (rho = -0.407, p = 0.001), and training (rho = -0.305, p = 0.025). This suggests that in instances where the team members felt pressed for time, they also felt participation in decision-making, communication, and training were negatively impacted. The duration item was significantly correlated with the item addressing the scope of the kaizen event (rho =



0.409,  $p = 0.001$ ). Many of the individuals who reported that more time would have been helpful also indicated that the scope of the kaizen event was too large. Interestingly, the duration of the kaizen event was significantly correlated with both the redirection item ( $\rho = 0.271$ ,  $p = 0.032$ ) and the facilitator item ( $\rho = 0.285$ ,  $p = 0.022$ ). These are rather weak in magnitude correlations, but they do suggest that when kaizen events do not provide ample time to adequately address the targeted issues, there is more facilitator participation in decision-making and management is more likely to intervene and redirect the kaizen event effort. Both of these factors, facilitator participation in decision-making and managerial redirection have been demonstrated to negatively impact the factors that constitute a climate of continuous improvement.

### **Scope**

Scope was significantly correlated with the duration item, but is worth examining as it was significantly correlated with other factors of interest. 15.3% of participants (team members and non team-members) thought the scope of the improvement was too large for a kaizen event. Almost 74% of team members disagreed with this statement, as compared to 33.3% of non team-members. More than 50% of the non team-members responded neutrally to this statement. Non team-members may simply have been unaware of the scope of the kaizen event, as it has already been shown that there were poor communications with non team-members in many organizations.

The item that assessed the large scope was significantly and negatively correlated with training (see Table 27). In other words, the team members that felt the scope was too large also felt that the training was deficient. The large scope was positively and

significantly correlated with managerial intervention/redirection and facilitator involvement in participation in decision-making. This finding suggests that the more broad the scope of the kaizen event, the more likely that there will be managerial intervention or redirection and more facilitator involvement in participation in decision-making. Both of these factors have previously been shown to negatively impact a climate of continuous improvement.

Scope was also significantly correlated with factors measured on both the team-member survey and the non team-member survey. A large scope was significantly and negatively correlated with participation in decision-making, communication, a climate of continuous improvement, perceived performance gains, satisfaction with kaizen events, coworkers' satisfaction with kaizen events, and the overall lean impact (see Table 28). Further investigation revealed that team status moderated several of these significant relationships (see Table 29). The correlations of scope by climate of continuous improvement, satisfaction with kaizen events, coworkers' satisfaction with kaizen events, and the overall lean impact were significant for non team-members only. Interestingly, careful considerations should be given to the scope of the kaizen event for reasons that not only impact the team members, but also the non team-members.

**Table 27. Kaizen Event Scope Correlations for Team members**

	Spearman's Rho	Training	Redirect	Facilitator
Scope	Correlation Coefficient	-.353(**)	.374(**)	.313(*)
	Sig. (2-tailed)	.009	.003	.012
	N	54	63	64

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

**Table 28. Additional Kaizen Event Scope Correlations**

Spearman's Rho		PDM	Commavg	CIavg	Goal	Sat Kaizen	Coworker Sat	Lean Impact
Scope	Correlation Coefficient	-.455(**)	-.480(**)	-.389(**)	-.387(**)	-.374(**)	-.205(*)	-.353(**)
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.019	.000
	N	130	130	130	132	132	131	131

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

**Table 29. Kaizen Event Scope Correlations by Team Status**

Scope by	Spearman's Rho	Climate of CI avg	Satisfaction Kaizen	Coworker Satisfaction	Lean Impact
Non Team-	Correlation Coefficient	-.452(**)	-.372(**)	-.323(**)	-.418(**)
Members	Sig. (2-tailed)	.000	.002	.007	.000
	N	66	68	68	68
Team Members	Correlation Coefficient	-.171	-.188	.095	-.140
	Sig. (2-tailed)	.177	.137	.461	.273
	N	64	64	63	63

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

Similar sentiments and other concerns about the short-term kaizen events were expressed in the interviews. A traditional kaizen event lasts between 3 and 5 full days, but some organizations have modified the time frame in an attempt to minimize disruptions to the workforce. Management's challenge is to structure a kaizen event such that the allotted time is sufficient to address the given issues and simultaneously minimize the disruption to the workflow. Several challenges were identified by management with regards to the structure of the typical kaizen event. First, managers acknowledged that it was difficult to dismiss team members from their regular duties for several consecutive days and expect them to catch up on missed work following the

kaizen event. 21.9% of the team members surveyed agreed with the statement, "I am very behind in my regular work because I have been busy with the kaizen event," and 46.9% disagreed. This may be a reflection of the level of temporary resources assigned to pick up the slack as team members leave their typical job responsibilities for the duration of the kaizen event. The item that measured the degree to which a team member was behind in his or her work duties was not significantly correlated with any other variables of interest in the study. In some instances, depending on the level of managerial support, other workers were temporarily assigned to the team members' regular work responsibilities in an effort to minimize this disruption. Secondly, managers commented on the expense associated with hiring outside consultants to run full day events for several consecutive days. Thirdly, managers noted that it was challenging to implement changes during a kaizen event in such a condensed period of time, particularly, if materials needed to be made or purchased in order to follow through with the improvements. Fourthly, managers recognized that the short time frame associated with kaizen events often delayed training for workers in the targeted area until after the changes had been instituted. Also, some managers believed the quick, hard-hitting kaizen events simply did not result in sustainable results because not enough people from the targeted areas were involved in the improvements. Lastly, team members noted that better improvements could have been made if more time was allotted in the kaizen event.

To combat the difficulties associated with the cost and work disruption associated with a full-day, multi-consecutive-day, format, the wholesale distributor elected to go with three half-day kaizen events. The metal laminate supplier sponsored a kaizen event where the first two days were held consecutively, and the third day was held about a

week and a half later. This allowed the organization to buy materials and equipment to complete all the changes needed for the kaizen event. The precision tool manufacturer also structured their kaizen events in this split-day format. The first two days were back-to-back, and then the third and final day was a week later.

Several organizations have attempted to differentiate between a short-term kaizen event and a longer-term lean initiative. At the container manufacturer, the traditional kaizen event has been somewhat phased out. "We were performing a lot of kaizen events but now we are living in an area for a longer period of time and we go in with the goal of staying until our goal is achieved." The new 6 to 8 week-long format was said to "allow more people to be heard across shifts." In the rare instances when the organization runs a kaizen event, they now focus on shorter term, 3 day events to minimize the disruption to the workflow.

The lean team at the mattress manufacturer has been meeting on a regular basis and working on projects that are typically longer term than the week-long kaizen events. The general manager of the molding and tooling manufacturer also "wants to move into larger events that are more sustainable." Four longer-term lean events had already been scheduled that would involve the workers from all shifts in the area. The lean coordinator believed this format minimized disruption in service and maximized worker involvement across shifts.

The senior director of manufacturing at the ice cream manufacturer was also considering longer term lean initiatives consisting of 1/2 hour daily meetings for 3 weeks with the workers in the targeted area. She felt the cross-functional teams used in the kaizen events didn't have a significant long term impact. The lean coordinator at the tool

and die manufacturer was also trying to hold long term initiatives in addition to the short term kaizen events. The kaizen events were typically half day events that lasted for one to two days total in order not to tie up a department for an entire week. He hoped to structure future kaizen events so that responsibilities were spread across all three shifts. For example, the first shift would do one part of the kaizen event, the second shift would do another part, and the third shift would do yet another part. In addition to the kaizen events, the tool and die manufacturer started month long lean initiatives that consisted of one hour group meetings scheduled three times a week to tackle a focused problem.

Of all the organizations, only the defense contractor seems to have developed a process to systematically assess whether an issue should be tackled with a long-term or a short-term lean initiative. In the defense contractor's lean program, each lean project is analyzed and assessed individually to determine which lean tool and lean approach would be most appropriate, whether it be a short kaizen event, a longer term lean approach, or simply an "OK" for a worker or department to go ahead and implement the proposed changes on the spot.

These findings suggest that topic chosen for the kaizen event should be carefully selected to ensure that the scope is adequate. If the scope is too large, the allotted time for the kaizen event may be inadequate and the performance gains could be limited and the climate of continuous improvement could be impacted negatively.

## Team Selection

Key finding: A team composed of employees with the appropriate skills to address the problem positively impacts the achievement of the goal, and also ensures employees will be satisfied and want to participate in subsequent kaizen events. In situations where the team members do not feel they have the skills to tackle the issues, the facilitator is more likely to intervene and participate in the decision-making.

**Table 30. Team Selection Correlations for Team members**

	Spearman's Rho	PDM	Training	Clavg	Goal	Bonding	Participate again	Sat Kaizen	Facilitator
Team Selection	Correlation Coefficient	.357(**)	.388(**)	.318(*)	.332(**)	.362(**)	.409(**)	.435(**)	-.404(**)
	Sig. (2-tailed)	.004	.004	.010	.008	.003	.001	.000	.001
	N	64	54	64	63	64	64	64	64

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

90.6% of team members agreed that management had selected a kaizen team that had the appropriate skill to tackle the problem. This item was positively correlated with other variables of interest within this study, including participation in decision-making, training, a climate of continuous improvement, achievement of the performance goal, team-member bonding, the desire to participate again, and satisfaction with kaizen events (see Table 30). This suggests that organizations that take the time to create an appropriately skilled team will also experience greater levels of commitment to the kaizen event and hence improve the overall climate of continuous improvement. Not surprisingly, team composition was significantly and negatively correlated with the facilitator's level of participation in decision-making. If the team has the appropriate

skills for the kaizen event objective, than the facilitator is less likely to intervene and actively participate in the decision-making during the kaizen event.

The level of team bonding amongst the members was also explored in the survey. Almost 80% of team members agreed that by the end of the kaizen event, the team members had developed a closer relationship with each other. Bonding was significantly and positively correlated with the performance goal, the belief that the team member's participation was significant, the desire to participate in another kaizen event, the satisfaction with kaizen events, and the coworker satisfaction (see Table 31). The bonding item was negatively correlated with the facilitator's level of involvement in participation in decision-making.

**Table 31. Bonding Correlations for Team members**

	Spearman's Rho	Goal	Participation Valuable	Participate Again	Sat Kaizen	Coworker Sat	Facilitator
Bonding	Correlation Coefficient	.345(**)	.402(**)	.425(**)	.416(**)	.300(*)	-.258(*)
	Sig. (2-tailed)	.006	.001	.000	.001	.017	.039
	N	63	64	64	64	63	64

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

In all cases, the kaizen event team members were selected by management. Only three organizations had a process in place used to select team members for the event. Two of the managers in the interview sessions noted that team selection was a key factor in running a successful kaizen event.

The defense contractor had the most detailed team selection process of all the participating organizations. The continuous improvement manager at the defense contractor felt that 'picking the wrong team' could ultimately lead to an unsuccessful



kaizen event. When selecting team members at the defense contractor, the manager tried to choose a subject matter expert, a high energy person, a doer, and someone motivated by deadlines. The teams typically included a team leader, members from the targeted area, as well as members from outside the targeted area. In some cases, they chose a master black belt candidate, a technology specialist, and/or a maintenance employee. As an example of a poorly selected team, she described a kaizen event that included six engineers who had "analysis paralysis" during the event and could not actually arrive at a solution. In other instances, the team leader was not trained sufficiently, and was therefore unable to give enough direction to the team.

Two of the organizations made sure that there were always team members who had previously been involved in kaizen events. The manager at the precision tool manufacturer typically selected team members such that a third of the team included people that had strong kaizen event experience (had been involved in three or four kaizen events), a third of the team consisted of individuals with minimal experience (had been involved in one other kaizen event), and a third of the team included employees that had never been involved in a kaizen event. When selecting the kaizen teams at the polyurethane manufacturer, management tried to keep two core people on the team from one event to the next in order to provide leadership to new kaizen event team members.

The team composition at the mattress manufacturer included only employees from first shift without representation from other shifts. This proved to be a factor in the sustainability of the kaizen event in question. At the mattress manufacturer, the production manager and the operations manager selected the team members, but employees could volunteer to participate. An employee interviewed at the defense

contractor felt very strongly that participation in the kaizen events should be strictly on a voluntary basis. As it is now, employees are selected and required to participate in kaizen events. The mattress manufacturer, on the other hand, has had selected individuals refuse to participate in a kaizen event.

### **Follow-ups and Auditing**

All organizations reported that success and sustainability of the kaizen event improvements were dependent on follow-ups and regular audits. This may seem obvious, but many organizations reportedly failed to follow-up after previous kaizen events and the improvements regressed over time. These scheduled audits occurred at different intervals, sometimes one month, three months, or six months after the event. In some organizations, improvements were audited on a daily basis. Daily audits were more prevalent following 5S kaizen events. The continuous improvement manager at the defense contractor said, "I don't see a huge difference between three and six months." Although most organizations did not track the changes beyond six months after the kaizen event, two managers believed changes that sustained 12 months after the kaizen event were most likely to not backslide. Those organizations that did not conduct follow-up audits were more likely to see improvements revert back to previous stages.

### **Implications of the Organizational Climate**

In order to examine the factors that attribute to the success of kaizen events, it is logical to address organizational factors (e.g. layoffs, turnovers, and previous number of

kaizen events) and attitudinal variables (e.g. job satisfaction, commitment, respect for top management, and trust) that could affect the kaizen event outcomes. If an organization describes its workforce as participative, communicative, and well trained, it will likely believe it has a positive lean climate. One of the participating organizations had recently refocused its efforts from lean training to cultural training. The operations manager at this company believed the improvement potential from kaizen events and other lean initiatives was limited because of the lack of a lean climate or culture. When asked if the most recent kaizen event had resulted in further improvement suggestions, she replied, “No, and that’s again why we need our cultural change. That’s where we keep falling down. There was opportunity to improve and it didn’t happen.” After she witnessed past kaizen event improvements that would not sustain, she refocused her efforts to cultural training and continuous improvement training and moved away from kaizen events.

The organization that had been conducting lean activities for the longest period of time, described kaizen events as only a portion of a broader lean initiative. In order to promote continuous improvement each supervisor assessed an employee's ability to 'adapt to change' as part of every performance review. In addition, recruiters from that organization considered an interviewee's 'ability to adapt to change' when making the decision to hire a prospective candidate.

## **Organizational Factors**

### **Layoffs/Turnover**

It was hypothesized (Hypothesis H3) that recent layoffs and high turnover rates would be negatively related to kaizen event performance, sustainability, and a climate of

continuous improvement. Although most managers that were interviewed believed that frequent layoffs and high turnover rates would lead to lower morale and inhibit a climate of continuous improvement, the data did not support the hypothesis. Despite the fact that the hypothesis was rejected, the negative ramifications of frequent layoffs and high turnover rates are still a real possibility. This simply means that in this study most organizations reported similar turnover rates and frequencies of layoffs and no great variability existed within the data, and therefore significant correlations were not found.

### **Past Experience with Kaizen Events**

Key finding: The number of previous kaizen events held at an organization was not significantly correlated with performance gains, sustainability, and a climate of continuous improvement. This surprising finding may be attributed to the small sample size (n = 11 organizations) that were studied. The number of previous kaizen events, however, was found to be significantly and positively associated with the motivation to continuously improve and positively associated with a non team member's belief that all the possibilities were considered.

**Table 32. Number of Previous Kaizen Events Correlations**

Spearman's Rho		Performance Gains	Sustainability	Climate of CI
No. Prev Events	Correlation Coefficient	.270	.217	-.210
	Sig. (2-tailed)	.421	.521	.535
	N	11	11	11

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

**Table 33. Additional Previous Kaizen Events Correlations**

	Spearman's Rho	Motivation to CI	Possibilities not Considered
No. Prev Events	Correlation Coefficient	.606(*)	-.782(**)
	Sig. (2-tailed)	.048	.004
	N	11	11

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

Kaizen event experience at each of the participating organizations ranged from just a couple previously held kaizen events to over one hundred. It was hypothesized (Hypothesis H4) that the number of previous kaizen events would be positively related to performance gains, sustainability, and the climate of continuous improvement. This hypothesis at the organizational level was not supported (see Table 32). However, further analysis did reveal that the number of previous kaizen events was significantly correlated with the item that measured the motivation to continuously improve and negatively correlated with the item that considered the non team-member's belief that not all the possibilities were considered. This suggests that both team members and non team-members were more motivated to continuously improve following the kaizen event as the organization became more experienced with running kaizen events. In addition, it seems organizations with more kaizen event experience are better equipped, whether because of improved kaizen event processes or simply experienced team members, to ensure that all the improvement possibilities are considered from the non team-members' perspective.

## **Attitudinal Factors**

### **Job Satisfaction and Commitment**

As previously mentioned, it is important to consider the impact that attitudinal variables may have on the factors that ultimately influence the outcomes of a kaizen event. Ultimately, an organization hoping to reap benefits from kaizen events is not only looking for the performance improvements, but is also hoping to affect positively the morale of its employees. It was hypothesized that components of a kaizen event, including participation in decision-making, communication and training, would be correlated with attitudinal factors, including job satisfaction and commitment (hypothesis H6). This hypothesis explored the impact that involvement variables would have on the attitudinal variables of job satisfaction and commitment. Weak but significant relationships were found between PDM and job satisfaction (hypothesis H6a) and communication and job satisfaction (hypothesis H6c). These weak relationships may be simply because the levels of participation in decision making and communication are not the only factors that influence job satisfaction. There may be other aspects of the job and managerial/coworker interactions that ultimately influence job satisfaction.

Moderate support was found for the hypotheses that participation in decision-making and communication would be correlated with commitment (hypotheses H6b and hypothesis H6d). In both cases, a stronger, more significant relationship was found for non team-members. This suggests that the level of commitment by non team-members is related to the participation in decision-making and communication during the kaizen event.

No relationship was found between the team member's level of training and job satisfaction. Training was significantly, but moderately related to employee commitment.

### **Trust, Job Security, and Respect for Top Management**

It was hypothesized that trust, job security, and respect for top management would be positively related to the perception of goal achievement, the motivation to continuously improve, and the climate of continuous improvement. This suggests that if an employee trusts and respects management, he or she is more likely to perceive performance gains and be more motivated to participate in continuous improvement efforts. Thus, the climate of continuous improvement would also be stronger. Again, team status played a moderating role in these relationships. It was found that non team-members' perceptions of trust, job security, and respect for top management, were more significantly correlated with goal achievement, the motivation to continuously improve, and the climate of continuous improvement. This suggests that these three attitudinal factors are a strong influence in a climate of continuous improvement and supports previous findings from idea systems' research conducted on the relationship between trust, respect for management, commitment and the motivation to participate in decision-making (Lloyd, 1999). Similarly, job insecurity was found to lower participation rates in employee involvement initiatives in previous research (Levine, 1995, Lawler, Leford, & Mohrman 1989; Kochan, McKersie, & Katz 1985; Bluestone & Bluestone 1992, Pfeffer 1998).

## Management's Role in Kaizen Event Performance

### **Top Management Support**

As in most change initiatives, top management support was flagged by managers in more than 40% of the cases as an essential determinant of kaizen event success. This support included long-term commitment to a lean transformation with management's dedication of employee time, equipment, and monetary resources to the effort. In some instances, processes were shutdown, team members were pulled from their regular responsibilities, and as a result, other employees needed to pick up the slack as these team members were devoted to the kaizen event for several full days. Managerial acceptance and support of these disruptions during a kaizen event were cited as key factors to success.

One organization noted that management's autocratic style did not empower the employees to continuously improve. The mattress manufacturers' management acknowledged that the company needs more lean commitment from the leadership team. The ice cream manufacturer had a similar sentiment explaining that there simply was no commitment from top management and most upper managers didn't attend the kaizen event report outs to which they were invited. The president of the wholesale distributor commented, "You have to have top management support for these things because they are disruptive. The way kaizens are supposed to go, it's supposed to take precedence over every other thing." At the defense contractor, the continuous improvement manager believes that top management support is the key and past initiatives like TQM failed because of a lack of this top management commitment. She said, "What's different now is that our parent company says you don't have an option. It's a recipe for great success."



She attributes much of the lean success to the current president's devotion to the movement and his unwavering support for the effort. The president of the polyurethane manufacturer is highly devoted to the lean effort and personally audits areas that have been the focus of a kaizen event.

The production manager at the metal laminate supplier actively shows his commitment to improvement by making frequent trips to the production area. "You're up close and personal. You're out there on the floor and getting flaming dirty. A lot of it is perception. If you're perceived as a desk jockey, you'll stay a desk jockey." The consultant at the precision tool manufacturer acknowledged top management support, but indicated that management style at the company was autocratic and as a result, it took a while to institute change." The hired lean consultant at the precision tool manufacturer believed that sustainability is driven by top-down commitment. Ironically, the kaizen event at this supplier resulted in proposed changes that directly impacted the responsibilities of the general manager, who was unable to attend because he was in a meeting. In fact, three out of five of the top managers were not present at the report out reflecting questionable top management support.

A strong indicator of an organization's commitment to a lean effort is often apparent in the degree of human resources that are dedicated to the lean effort, in particular, the person who is responsible for organizing the lean initiatives. In the four small companies, the lean activities were overseen by an upper-level manager, such as the president, vice president of manufacturing, the division manager, or the production manager. Lean activities represented only a moderate proportion of their daily responsibilities. In the mid-size companies, the lean initiative was organized by an

upper-level manager, such as a senior director of manufacturing, operations manager, a general manager, or a dedicated lean coordinator (such as a continuous improvement manager or lean coordinator.) In the two large companies, the lean approach was directed again by either an upper-level manager (an operations manager) or a dedicated internal lean coordinator. In all, three out of the eleven companies had an individual whose primary focus was in the area of lean activities and continuous improvement, two with the title of lean coordinator and one designated as the continuous improvement manager.

A kaizen event can be a big disruption to regular work duties and management's handling of this disruption is yet another indicator of their true commitment to lean. For example, the team members typically spend 100% of their time devoted to the kaizen event and not their regular responsibilities. The level of support provided in these areas vacated by the team members to fill the void is an indication of top management's level of support. In some cases, management still expected team members to abandon the kaizen event's activities if something more important came up related to their job.

### **Supervisor Support**

Key finding: Almost 70% of the participating organizations indicated that supervisors were not supportive of continuous improvement efforts following the kaizen event. As a result, improvements were more likely to regress and employees were less likely to buy-in to lean efforts.

More than 70% of the participating organizations indicated that middle managers' commitment to lean and continuous improvement played a key role in the success and

sustainability of kaizen event process improvements. Supervisors were typically responsible for conducting the follow-up audits after the kaizen events. In some instances, these audits did not occur as planned, or they did occur but supervisors did not solicit further improvements to the process. In fact, at several organizations, the employees reported that middle management rarely asked for input from frontline workers at any point in time.

Employee involvement and continuous improvement are at the heart of creating a lean climate. If supervisors are not trained and equipped with the resources to tap into the ideas of frontline workers, then the ability to identify future improvements is lost. Several of the organizations were planning to hold supervisors accountable for the kaizen event follow-up audits by establishing performance expectations that included frontline worker involvement.

A worker at the metal laminate supplier discussed his frustrations with improvement suggestions. "The supervisor doesn't care. He wants production, production, production. They want production they don't want us to waste our time fixing the job." The Vice President of Manufacturing at the metal laminate supplier recognized the supervisors' reluctance to accept lean. The supervisors argue that it's [lean] just one more thing to do, but over the last couple of months morale has seemed to improve. He attributed this improvement to a new supervisor evaluation form that includes lean objectives.

The lean coordinator at the precision tool manufacturer attributed backsliding in a kaizen event to a "lack of interest and lack of leadership." In particular, the foremen at the company were not following up. A meeting was organized by the lean team with the

supervisors to discuss the lack of worker involvement. Ironically, only five out of the twenty managers attended the meeting. To encourage continuous improvement behavior from supervisors, the lean coordinator was considering the inclusion of lean cooperation in the performance review.

A lean coordinator at the defense contractor feels that the supervisors are following up after the kaizen event and it's the upper middle managers who are non-cooperative because they hold the "purse strings." However, she did mention that workers can make improvements following a kaizen event only if they get supervisor approval. One interviewed worker believed that success of the kaizen is often dependent on the supervisor's interest in gathering input from the workers. Some of the supervisors truly wanted to incorporate suggestions following the kaizen event, while other supervisors simply insisted the workers maintain the kaizen event changes regardless of their effectiveness.

### **Managerial Intervention and Redirection**

Key finding: Employees at more than 40% of the participating companies felt that the outcome of the kaizen event was directed by management or predetermined by management. Employees that felt management intervened during the kaizen event process were more likely to report dissatisfaction with the kaizen event.

In some cases, the kaizen event teams were not empowered to make decisions without management approval, direction, or intervention. 12.7% of team members believed that management disagreed with the team's approach to the problem and redirected the efforts. In fact, there were some instances where management had

predetermined the desirable result of the pending kaizen event. Those employees that recognized the managerial interventions were more likely to express frustration with the kaizen event process.

The team at the wholesale distributor was redirected after the very first day because management felt they were headed down the wrong path. As a result, the team lost momentum and felt discouraged and less valued. Interestingly, the majority of the proposed solution appeared to come from the consultant hired to be the facilitator, who admittedly wanted to please management and ensure that the kaizen event went in a direction that management deemed appropriate. On a daily basis, the facilitator had private conversations with the president to make sure the kaizen event was unfolding in a direction acceptable to the President. The facilitator said, “Sometimes the situation is touchy. You have to make it look like management wants this, not us.” It seemed that the facilitator was trying to convince the team members that they were empowered to make their decisions, while at the same time, attempting to convince management that the final outcomes were the most desirable. A similar circumstance occurred during the container manufacturer's kaizen event, where management told the internal facilitator to refocus the kaizen event.

The continuous improvement manager at the defense contractor described situations in the past where the kaizen event team members had developed recommendations that were rejected by managers at the report-out. In some instances, these managers were unable to attend the daily team leader meetings (between the team leaders and management) where information owned by management could be shared with the team leaders and vice versa. In some cases, it was the managers that were unable to

attend the bi-directional meetings that felt the team arrived at a solution without full consideration of all the appropriate information. One team-member expressed concerns with the daily team leader meetings because he felt as if the managerial redirection forced the team to start over.

At a fourth organization, the kaizen event team could not implement the proposed improvements without managerial approval. The kaizen event at the precision tool manufacturer proposed changes that directly impacted the responsibilities of the general sales manager, who was unable to attend the report-out because he was in a meeting. For this reason, the changes were put on hold until the general sales manager could make the final decision. In all, workers in four of the eleven organizations alluded to managerial interventions to refocus the kaizen event effort.

During interviews at two separate kaizen events, the employees shared their beliefs that management had established prior to the kaizen event a desirable outcome or solution. According to these workers, the kaizen event was intended to give the illusion of participation in decision-making in an attempt to steer the team members and non team members alike in a predetermined direction. In both instances, there were some workers who reported positive experiences with the kaizen event, but several workers recognized this managerial intervention and expressed negative experiences with the kaizen event process.

The lean coordinator at the tool and die manufacturer was dejected about the reported failure of the kaizen event. “The event was somewhat directed by management instead of letting the team go in its own direction. I’m disappointed because the creativity of the team was halted. It felt like soldiers being led. As soon as the change of

direction came, I lost the entire team. As facilitator, the wind was taken out of my sails.” The process engineer at the second defense contractor had a similar sentiment about kaizen events, "I don't want to be part of another kaizen event. I think in some of the events, the outcome is predetermined.” The lean coordinator from the defense contractor commented that there was a time period when the kaizen event appeared to be predetermined and directed by management, but as the number of kaizen events increased, this practice seemed to diminish.

Managerial redirection was negatively and significantly correlated with the team members' desire to have additional kaizen events ( $\rho = -.271, p = .032$ ) and managerial redirection was negatively and significantly correlated with the team members' belief that kaizen events had brought the organization one step closer to becoming truly lean ( $\rho = -.365, p = .004$ ). In other words, if management intervened during the kaizen event, then workers were more likely to express dissatisfaction with the kaizen event process.

### **Employees' Satisfaction with Kaizen Events**

#### **Buy-in**

Key finding: Some employees did not buy-in to lean efforts for a variety of reasons, including fear of job loss, resistance to standardization, indifference, past experience with change initiatives, job dissatisfaction, and resistance to change. Some organizations improved the level of employee commitment by making participation in lean efforts part of their job requirements.

In 40% of the organizations, managers believed cooperation and employee commitment to the lean effort positively contributed to successful kaizen events. Employees were reluctant to accept and commit to the lean effort for a variety of reasons. Some employees believed that layoffs would be a byproduct of a lean movement and were in fear of their jobs. For this reason, there was reluctance to participate in cross-training. Others expressed concerns with standardization believing that their jobs relied too heavily on making educated decisions based on years of acquired experience and education. Standardizing processes, in their view, would demean and over-simplify the trade and skill required to perform their jobs. Some employees simply did not have faith that adopting lean would be different than any of the failed improvement initiatives in the past. While others may have not bought-in to the lean effort simply because they were not satisfied with their jobs and ultimately did not care about the fate of the organization. Finally, there were the individuals that were simply reluctant to adopt to change in almost any shape or form, and therefore were not committed to adopting lean. Of course, it would be difficult to enumerate all the reasons individuals were not supportive or committed to lean, but these aforementioned reasons offer a starting point to address the lack of employee commitment to the lean effort.

In most cases, these organizations were not striving to get buy-in from all the resistant workers, but instead looking to get at least 80% of the workforce committed to the lean effort. Besides communicating the benefits of lean adoption, some organizations went so far as to require participation in lean activities. For example, after their 5S kaizen event, the metal laminate supplier found that only two of the five individuals in the targeted area were doing the assigned 5S activities. These individuals that were doing



the daily 5S activities complained, “Hey, we’re busting our butts and these guys are watching.” Therefore, the company assigned specific 5S duties to each of the five workers in the area. Whether or not this improved commitment, is not known, but it did force widespread involvement in the effort and satisfied those workers who were previously doing all the work.

Similarly, a manager at the precision tool manufacturer believed the past improvements lasted because they were “forced.” In other words, the managers followed up on a regular basis and required employees to complete 5S activities. The manager attempted to gain buy-in through discussions related to the benefits of lean implementations. He commented, “All you need is one or two people in a room that are not going to sustain. You can’t threaten them with lack of raises.” Management at the polyurethane manufacturer tried to use the employees that were committed to the lean effort as a means to influence the others that were against the lean transformation. In all, it was estimated that 50% of the employees were against change. The defense contractor required executive staff to participate in at least two kaizen events per year, and managers to participate in at least one kaizen event per year.

The operations manager of the ice cream manufacturer discussed her workforce's presumption that workers would lose their jobs if lean was implemented. She commented, "The fear was a job hunt. They thought we were going to eliminate people as a result of it. Let’s do more with less people. We reassured them." When approaching workers to be on the kaizen team, one manager often heard, “It’s not worth it. I don’t want to be part of it and I don’t want to present during the report-out.”

The defense contractor experienced a group of individuals who were reluctant to adopt lean practices because they disagreed with the benefits of standardization. It used to be that 'craftsman' would actually bring their own toolboxes to work to perform their tasks based on previous knowledge and experience as opposed to standardized operating procedures. Standardizing the processes and tools prevented the workers from using their own tools. The workers felt that standardization sent the message that anyone could do their jobs regardless of their level of experience or expertise. The organization has also experienced this resistance to standardizing processes at the managerial level. The feeling was that standardizing the processes essentially prevented the employees from using their brains to make informed decisions. The challenge was to standardize processes while showing the workers that they are still valued. One non team-member complained that her job could not be standardized because the purchasing tasks were too complicated and there were multiple scenarios for each task.

Several organizations have noticed that the number of employees committed to lean has increased over time. According to the VP of Manufacturing at the precision tool manufacturer there are about 5% of the workers that are still not on board and stuck in “their stubborn ways”. He indicated that most of the reluctant workers are supervisors because they believe it's just one more thing to do. However, he noticed a recent improvement in commitment to lean, which he attributed to a new evaluation form that included lean performance metrics.

The production manager at the polyurethane manufacturer noted that workers have begun realizing that lean can make their jobs easier. He contends that he’s “never heard a negative word about kaizen events.” However, there were some instances where

workers believed the kaizen event resulted in increased workloads. A few organizations reported that material handlers' were plagued with increased workloads following a kaizen event, particularly in kanban implementations with higher replenishment rates of materials to the targeted areas. At the container manufacturer, for example, the workers were unhappy that the boxes in the area had to be replenished more often. Materials handlers at the molding and tooling manufacturer also expressed concerns with the increased number of trips required for replenishment as the process lot size was reduced.

Interestingly, the piece rate system at the precision tool manufacturer was identified by management as a road block to cooperation. It was challenging to convince workers that they should devote their time to lean training when they could be making more money doing piecework. As an effort to alleviate this situation, workers were paid during training based on an hourly basis determined using their average hourly-pay over the ten weeks prior to training.

The tool and die manufacturer had been offered a series of different challenges during lean implementation which the lean coordinator attributed to the union status of the workers. When the company conducted a Total Productive Maintenance (TPM) kaizen event that required daily checks by the operator, a couple senior level union people grieved it because they said TPM was not an operator issue. It made it to a level two grievance and the supervisor decided to abandon the TPM instead of wasting time with the grievance.

In addition to commitment or buy-in there is also the consideration of the desire of employees to participate or be involved with a future kaizen event given their experiences and job satisfaction. At the wholesale distributor, 75% of the employees

would like to continue holding kaizen events according to an employee opinion survey. Approximately, 20 to 30% of the workforce has participated on a kaizen team. The operations manager at the mattress manufacturer noted that morale usually improves immediately following the kaizen event, but in the studied kaizen event morale declined soon after. Two workers interviewed indicated that they would like to participate in future kaizen events despite the poor results from this one.

90.6% of team members want their organization to keep having kaizen events, compared to 60.3% of non team-members. 57.1% of team members believe their coworkers want the organization to keep having kaizen events compared to 29.4% of non team-members. Almost 60%, however, of non team-members were not sure how satisfied their coworkers were with kaizen events.

## Necessity for a Kaizen Event

Key finding: Those kaizen events that focused on managerial processes without managerial representation on the team resulted in undesirable outcomes. The improvements made in kaizen events that focused on narrow processes could have been achieved without the use of kaizen events.

Having discussed, 'what works and what doesn't' in kaizen events, there is one question that remains unanswered, "Is a kaizen event necessary in order to continuously improve?" For some organizations the answer is, "It depends." According to these organizations, it depends on the scope of the targeted problem.

The defense contractor, for one, does not believe that kaizen events are always necessary or even appropriate to make improvements. According to the CI manager at the defense contractor, "Kaizen events work because they are very targeted and the scope is at a level that can be achieved. If there's a little too much unknown, not a lot of data on the past performance, it's reckless to do it in a week. If it's large in scope, handle it as a continuous improvement project." If, on the other hand, it's a problem to which an employee has a solution, then the employee is empowered to 'just-do-it.' Corporate actually details a kaizen process including roadmaps for individual lean tools outlining the when, what, and how. She believes, "You can't wear people out on kaizen just to do kaizen." The plant manager at the second defense contractor didn't feel you had to necessarily have a kaizen to get results, but did believe the kaizen event is a way to dedicate resources to an initiative.

At The wholesale distributor's, the kaizen event was targeted at a managerial process, but there were no managers on the team. As a result, there were frequent

managerial interventions and the team members were frustrated with the lack of autonomy. In addition, the facilitator and management ended up making the majority of the decisions during the kaizen event. One worker expressed her belief that management was truly not interested in changes proposed by subordinates. This worker went on to say, "Because he (the facilitator) is from outside and doesn't work here there wouldn't be this sense of a non-management person suggesting to management how to do their jobs."

The lean coordinator at the tool and die manufacturer questioned the appropriateness of applying kaizen event activities to the targeted problem. "I still don't even know if this qualified as a kaizen. I look at this as a day-to-day business decision." The lean coordinator felt that morale had suffered greatly because of management's intervention during the kaizen event. He believed the kaizen event was held so that the team members could be convinced to do it the way that management desired.

If you weigh the necessity of a kaizen event solely on the achievement of the sought after process improvement goal, then perhaps a kaizen event is not necessary. In some cases, workers revealed that they had made suggestions similar to the ones proposed during the kaizen event prior to the organization of the kaizen event. However, as discussed at the outset of this qualitative analysis, obtainment of this goal may not be management's only objective.

A team-member at the ice cream manufacturer had a solution in the back of his head prior to the event and didn't believe the kaizen event was necessary to get to the solution. Another interviewed employee said, "Kaizen events are extreme," explaining that you don't need a week long full-day event to come up with these basic ideas and improvements.

At the container manufacturer, the manager indicated that employees have said, “Do we really need those? According to him, “All are convince afterward. It’s a knee jerk reaction and then things settle down and they come back with suggestions. The resistance seems to be shrinking every time.”

At the molding and tooling manufacturer, the Chief Operating Officer actually encouraged the employees to look for improvements the entire time saying, "Don't let things that we give you get in your way. Challenge the system. You can do it yourselves. You don't have to have a kaizen.”

An employee from the first defense contractor had already participated on five or six kaizen teams and shared his sentiments with regards to the structure and necessity of kaizen events. "I disagree with kaizen events in a way. It seems like a waste of time. You've got six or seven guys in there for a whole week. You lay it out on paper and it looks good, until you get on the floor and start moving around. It never ends up the way it was on the paper. We tend to do them at the busiest times. It would be better if we did things when were slow during that three month span. It would be better if you got the guys on the floor with the guys that work there everyday. The engineers on the kaizen team aren't really familiar with the product and you have to explain everything. I think it's good for the engineers because they get experience and know the product more. You're going to get more realistic ideas from the guys that work there everyday.” 9.4% of team members surveyed believed the organization did not need a kaizen event to identify the improvements.

**Table 34. Summary of Results**

<b>Hypothesis</b>		<b>Support</b>
<b>H1</b>		
	H1a	No Support: Team Members Strong Support: Non Team-Members
	H1b	No Support: Team Members Strong Support: Non Team-Members
	H1c	Moderate Support: Team Members Strong Support: Non Team-Members
	H1d	No Support: Team Members Strong Support: Non Team-Members
	H1e	No Support: Team Members Strong Support: Non Team-Members
	H1f	No Support: Team Members Strong Support: Non Team-Members
	H1g	No Support
	H1h	No Support
	H1i	No Support
<b>H2</b>		No Support
<b>H3</b>	H3a	No Support
	H3b	No Support
	H3c	No Support
	H3d	No Support
	H3e	No Support
	H3f	No Support
<b>H4</b>		
	H4a	No Support
	H4b	No Support
	H4c	No Support
<b>H5</b>		
	H5a	No Support: Team Members Weak Support: Non Team-Members
	H5b	No Support
	H5c	No Support: Team Members Moderate Support: Non Team-Members
	H5d	Weak Support: Team Members Moderate Support: Non Team-Members



	H5e	Weak Support: Team Members Moderate Support: Non Team-Members
	H5f	No Support: Team Members Strong Support: Non Team-Members
	H5g	No Support
	H5h	Weak Support
	H5i	Weak Support
<b>H6</b>		
	H6a	Weak Support
	H6b	No Support: Team Members Weak Support: Non Team-Members
	H6c	Weak Support
	H6d	Weak Support: Team Members Moderate Support: Non Team-Members
	H6e	No Support
	H6f	Weak Support
<b>H7</b>		
	H7a	No Support: Team Members Moderate Support: Non Team-Members
	H7b	No Support: Team Members Moderate Support: Non Team-Members
	H7c	Moderate Support
	H7d	Weak Support: Team Members Moderate Support: Non Team-Members
	H7e	No Support: Team Members Weak Support: Non Team-Members
	H7f	Weak Support
	H7g	No Support: Team Members Moderate Support: Non Team-Members
	H7h	Weak Support
	H7i	Weak Support: Team Members Moderate Support: Non Team-Members

## CHAPTER V

### DISCUSSION AND CONCLUSIONS

#### Discussion

Kaizen events were pioneered at Toyota as a means to introduce lean philosophies associated with the Toyota Production System to its suppliers. Today, kaizen events are in widespread use with organizations boasting of drastic process improvements in focused areas with relatively little concern as to whether they are effective as broad-based continuous improvement tools. Several researchers noted that sustaining kaizen event improvements after the kaizen event ended was often problematic (Dale, 1996; Kaye & Anderson, 1999; Griffiths, 1998). The objective of this research was to examine factors that contributed to the success and sustainability of kaizen event outcomes using both qualitative and quantitative methods. Triangulation allowed for results that incorporated different perspectives and different views of reality. What was reported by individuals was not always what was observed by the researcher. The findings from the surveys converged in many cases with the findings from the interviews and observations, but in some cases there were important divergent findings that uncovered salient points requiring further examination.

## Discussion of Findings

### **Non Team-Member Involvement and Input is Critical**

Kaizen events are often highly structured initiatives and careful consideration is given to selecting the facilitator, assembling the team, administering the training, establishing the goal, and following the pre-determined schedule. Typically, the cross-functional team members are encouraged to participate in the decision-making and are significantly involved in the kaizen event process. However, it is often the case that workers in the targeted area are not selected to serve as team members and, surprisingly, not invited to participate in the kaizen event decision-making. Initially, a worker in the targeted area may be enthusiastic to improve aspects of his or her job and believe that the kaizen event will offer the opportunity to make suggestions. Unfortunately, if this study is representative, many non-team members in the targeted area are not asked for input by the team members, or their input is provided but not considered by the kaizen event team members.

In some cases, non team-members are not even made aware of the upcoming kaizen event. As a result, the non team-members may not know the goal of the kaizen event or the potential impact on their job responsibilities. When communications with the non team-members are poor there is a greater likelihood that the results will be unfavorable. Not only may the performance gains be limited, but the workers may grow dissatisfied with future kaizen events and other lean endeavors.

Lack of involvement from non team-members becomes problematic following the kaizen event as well. For example, the changes may be implemented in the workers' areas without communicating the proposed improvements to the non team-members. The

workers may be confused by these sudden, imposed changes in their work areas and less likely to adopt all the changes over the long-term. In some instances, workers may be faced with heavier workloads requiring them to function at a faster pace. Another real possibility is that the workers discover that the proposed improvements actually do not work at all or the process is less efficient because there were aspects of the job that were not considered by the kaizen event team members. After all, the workers in the targeted area, who are most familiar with the job elements targeted in the kaizen event, may not have been asked for their input. These findings support the research conducted by a group of Cornell Students, who found a similar situation whereby second shift workers in an organization were not made aware of the implemented changes (Bradley & Willet, 2004).

In some situations, the workers suggested improvements to the implemented changes only to encounter resistance from supervisors because the kaizen event was already deemed a success by the team members and upper management. If the changes implemented from the kaizen event are immediately changed again following the kaizen event, supervisors may believe that this will send a message to management that the kaizen event is not as successful as originally thought. This might also suggest that the same improvements could have been possible without a full-scale kaizen event. Also, the team members who implemented the improvements may feel ownership of the changes and therefore reluctant to accept suggestions to alter the kaizen event improvements. Perhaps if the kaizen team consisted primarily of the workers in the targeted area, the suggested improvements would be more sustainable. Further, workers in the area who

serve as team members would be better able to see additional improvements following the kaizen event because they will be working in the targeted area thereafter.

Despite the finding that non team-member involvement positively impacts the success and sustainability of the kaizen event as well as a climate of continuous improvement, not a single manager that was interviewed identified non team-member involvement as a key factor in a kaizen event's success. In some cases, the non team-members were the only employees that believed the kaizen event goal was not achieved. A much larger percentage of non team-members were dissatisfied with kaizen events than team members. In addition, non team-members believed there were a lot more resisters to kaizen events in the organization. The team members often had a different perspective and believed most coworkers were in favor of continuing the kaizen events. A large number of non team-members were also unconvinced that kaizen events would make an organization more lean. This research empirically demonstrated that non team-members are key to a successful kaizen event, yet most organizations focus on only the team members' involvement. Researchers cited involvement of the worker in decision-making as the heart of lean philosophy (Banker, Potter, & Schroeder, 1993; Hall 1987; Johnston 1989; Schonberger, 1982), yet in many organizations involvement in decision-making is not fully imbedded within the kaizen event processes. This research found that the lack of involvement by non team-members could partially explain why kaizen events often fail to sustain.

The lack of non team-member involvement in decision-making and the resulting negative attitudes of these workers reinforces the referent cognitions theory (Folger,

1986), which posits that negative attitudes are greatest when a person believes that alternate decision-making processes would lead to more favorable results.

### **A Rewarding Team Member Experience is Dependent on the Scope and Duration**

This research demonstrates that the team members typically find participating in kaizen events to be a rewarding experience. Firstly, team members are usually hand-selected by management to participate in these exclusive events. Simply by being asked to participate on the team, the team members felt involved in the kaizen event process and realized that participation in decision-making during the kaizen event was a primary responsibility of each team-member. Many of the team members are unfamiliar with the targeted process and sometimes intimidated by their lack of knowledge about the area of focus, while other team members may be eager to learn about the process. To some of the team members the kaizen event may be a welcome diversion from their normal daily work routines. Other team members may even embrace the experience as an opportunity to 'shine,' as kaizen events are typically watched closely by management, which is very interested in the outcome.

Following the kaizen event, team members often feel a sense of achievement and pride in the attainment of a measurable goal. Regardless of the actual level of participation, team members frequently report significant levels of involvement. In addition, most team members report a heightened desire to continuously improve following the kaizen event. During the report-out, the team members have the opportunity to share their accomplishments with coworkers and managers. The team members have not only learned about elements of work in other areas, but in the process

they have developed positive working relationships with fellow team members. Most of the team members are heavily involved in the kaizen event process and most report high levels of satisfaction following the kaizen event. Even in instances where management felt the kaizen event was unsuccessful, many team members still reported positive performance gains. For many team members, a successful kaizen was simply the achievement of the pre-established goals, and the broader implications to the lean climate were deemed unimportant.

Although most team members seem to have a positive experience, this research did find that some team members believe the duration of the kaizen event is too short and more time would have been advantageous. As kaizen events have grown in popularity, this research (see Chapter 4, section Duration and Scope for discussion) suggests that some organizations are hoping to transition into longer-term initiatives and get away from short-term kaizen events. When the kaizen event was considered too short, facilitators were more likely to participate in the decision-making and management was more likely to intervene in the kaizen event and redirect it in order to produce a favorable (from management's perspective) outcome.

Establishing the scope of a kaizen event is often difficult. If the scope of the kaizen event is too large, a facilitator is more likely to participate in the decision-making, perhaps because the team members are overwhelmed by the breadth of the kaizen event topic. Once facilitators are actively involved in the decision-making in the kaizen event, as opposed to simply facilitating, the team members are less likely to participate in decision-making and are more likely to grow dissatisfied with kaizen events in general. In addition, this facilitator involvement in decision-making affects the chances of

attaining the event's goal and detracts from the climate of continuous improvement. On the other hand, when the scope is set too narrowly, the team members may feel that a kaizen event is not necessary to identify the improvements. In conclusion, most team members report positive experiences and successful outcomes in situations where the scope of the kaizen event is manageable within the allotted time frame, and negative experiences and outcomes when it is not.

### **Top Managements' Commitment to Lean is Key**

Most top managers have heard of lean manufacturing and the purported benefits associated with the adoption of lean concepts, but they also understand that it is a long-term initiative and the rewards cannot be reaped instantly. However, they often forget this when they encounter a lean tool called a "kaizen event" that purports to be quick, easily implemented, and likely to produce significant performance gains. Even more appealing is the fact that there are state-awarded grants that defray much of the costs involved. This can make it nearly impossible for top managers to resist kaizen events. Each one is not a huge commitment because it lasts only a few days and team members are selected from various departments throughout the organization, which minimizes disruption to the workflow.

The kaizen event is also supposed to empower the employees to make their own decisions. This claim, however, is somewhat problematic because in some instances the team members may believe they are collaborating in finding a solution, but in reality, management may be directing the kaizen event through office interactions with the facilitator in a direction that is desirable from management's perspective. After all, the



facilitator is hired by management, which is ultimately going to judge the outcome of the kaizen event. The outside consultant probably would like to be invited back for future kaizen events.

Since research has shown that top management support is vital in lean implementation (Vora & Scraph, 1990) and kaizen events are considered to be a lean tool, it would be logical to conclude that top management support is also important when running kaizen events. In order to demonstrate support for kaizen events, the top managers typically attended the report-outs to show appreciation for the teams' hard work. The numbers reflecting the achievement of the goal were usually impressive and the event was typically deemed a success. Subsequent kaizen events were scheduled and management kept supporting the kaizen events until the grant money was depleted. To a considerable extent, I believe many of the kaizen events were grant driven.

Perhaps this research demonstrated what pervious research has found, whereby adopting a lean tool (e.g. a kaizen event) in isolation without consideration of the entire lean philosophy does not attain the anticipated benefits (Clode, 1993; Gilbert, 1990; Liker, 2004). Not all organizations focus solely on kaizen events as a stand-alone tool to implement lean and not all organizations only run kaizen events because there is grant money available. Some organizations emphasize a climate of continuous improvement, because they believe it is vital when adopting the lean philosophy. These organizations recognize that kaizen events are not always necessary or appropriate in all circumstances. Some managers identified the possible intangible benefits of a kaizen event, such as employee involvement, communication, knowledge sharing, and lean education, which promote a climate of continuous improvement. However, no organization in this study

actually assessed changes in any of these intangible improvements. Perhaps, the tangible performance metrics that are the focus of so many kaizen events should be considered in conjunction with the possible lean climate gains and the impact on a climate of continuous improvement. Measuring the intangible factors that contribute to a climate of continuous improvement may provide a better snapshot of the efficacy of the kaizen event.

Most importantly, managers in all organizations focused on the team members' experience and neglected to consider the non team-members' experience. In my opinion, companies that recognize the kaizen event's ability to affect the lean climate will be better able to improve the kaizen event and achieve better results in subsequent kaizen events. Previous research has found that company practices are an indicator of an organization's commitment to an employee (Settoon et al., 1996; Wayne et al., 1997).

### **Supervisors' Challenging Role in Sustainability**

This research did not target or sample the supervisors responsible for managing the employees working in the targeted areas, but interviewees referred quite often to their supervisors and it became apparent that these managers played an important role in the sustainability of improvements. Supervisors often served as an intermediary between kaizen event team members and the workers in the targeted area. In situations where the workers in the area were not pleased with the purported kaizen event improvements made to their job operations, the supervisors were often the ones to hear these concerns. I believe that this placed the supervisors in a difficult position, because the kaizen event

may have been deemed a resounding success by kaizen team members and upper managers alike.

In a typical kaizen event, the team members spend a substantial amount of time generating and implementing ideas for improvement. When the kaizen event is over, the workers in the targeted area may have recommendations for improving the changes that were implemented by the team members. It is possible that these workers' ideas may not be welcomed because undoing or affecting the changes may send the message that the kaizen event did not generate optimal solutions. Given that a lean organization is built on a climate of continuous improvement and employee involvement, it is counterproductive to unwittingly create an environment where supervisors ignore the workers' post-event ideas for fear of upsetting the kaizen event team members and consequently the upper managers interested in the high profile lean initiative. Several of the organizations in this study sponsored kaizen events hoping to motivate workers to continuously improve, but then halted the effort as soon as further changes by non team-members were suggested. The supervisors may have realized that further adaptations suggested by the workers to the kaizen event changes were necessary, but felt compelled to maintain the kaizen event results in order to satisfy kaizen event team members and management. The workers, in turn, may be discouraged by their supervisor's lack of employee support. Given that previous research has found that lean production failures were often attributed to managerial resistance due to fear of power shifts or managerial reluctance to encourage employee involvement (Yasin, Small, & Wafa, 1997), it was not surprising that a similar phenomenon was uncovered in this research on kaizen events.

### **Kaizen Event Coordinators' Structural Decisions**

In this research 30 to 50 percent of kaizen event improvements backslid within three to six months and other researchers have noticed a similar phenomenon (Veech, 2004). It is the coordinator's responsibility to minimize these regressions through careful structuring of the kaizen events. At the outset, the kaizen event coordinator usually decides who will be responsible for facilitating the kaizen event. Most organizations initially hire an outside consultant to facilitate the kaizen events, and then transition to an internal facilitator. The kaizen event coordinator is also usually responsible for selecting the team members. This task cannot be taken lightly because it has implications throughout the kaizen event process. When the team members have the appropriate skills to address the problem it is more likely that the goal will be achieved and that the team members will be satisfied and want to participate in subsequent kaizen events. In situations where the team does not have the appropriate skills, the facilitator is more likely to intervene and participate in the decision-making, resulting in a host of negative consequences. The kaizen event coordinator must also take particular care in setting goals, ensuring these are met and sustaining these improvements. As the organization gains experience hosting kaizen events, the individuals associated with the kaizen event may become more motivated to continuously improve. This would be a sign that the kaizen events are making a difference. In addition, as organizations gain experience and refine their kaizen event processes, the teams become better equipped to ensure that all the improvement possibilities are considered from the non team-members' perspective.

## Conclusions

### **Principles for Making Kaizen Events Successful and Sustainable**

Based on my research and understanding of the literature, here is what I would advise to top managers and kaizen event coordinators.

#### **Top Management**

Support the kaizen events strongly from the top-down, but measure the success of the kaizen events from the bottom-up. To support the effort from the bottom-up, measure goal attainment from the perspective of both the non team-members and the team members. Identify and enumerate non-performance related goals, such as knowledge sharing, eased relations, and an increased motivation to continuously improve. Recognize that there are non-performance gains to be had and establish goals related to these intangible benefits. Avoid interfering in the kaizen event proceedings, and do not redirect the focus of the kaizen event or provide solutions.

From the top-down, appoint a knowledgeable and experienced lean coordinator and dedicate resources to the effort realizing that true lean implementation is a long-term initiative. Dedicate resources to the kaizen event effort and require all top managers to attend kaizen event report-outs. Provide the appropriate resources to cover the work of team members while they are participating in the kaizen event. Visit the targeted area frequently and interact with the workers to ensure that they are being involved in the kaizen event process.

Don't forget the supervisors. Make sure that supervisors are made aware that suggestions from frontline workers following the kaizen event are welcome and beneficial. The kaizen event only creates the potential for even more change. Incorporate continuous-improvement efforts into the supervisors' performance reviews and measure these based on the managers' abilities to motivate employees to submit ideas.

Also, look at the big picture to determine how kaizen events fit into the overall lean initiative. If a climate of continuous improvement does not seem to exist, then care must be taken to involve the front-line workers in the kaizen events to a greater degree. It may be advantageous to institute other initiatives dedicated to furthering continuous improvement from the bottom-up, such as idea systems, which may be better equipped to tap into front line workers' knowledge and recommendations. The kaizen event impacts the team members and the workers in the targeted area, but an idea system can share improvements across the organizations for the long-term making continuous improvement a real possibility.

### **Kaizen Event Coordinator**

Although kaizen-events are administered from the top down, it is critical to involve all the non team-members in the area as much as possible before, during, and after the kaizen event process. If the workers are involved and the performance goals are not achieved, at least the climate of continuous improvement and the morale of the workers will be positively impacted. Communicate the reason for having the kaizen event, the date and duration of the kaizen event, the expected role of the employee, the

impact on the employee's job responsibilities, and the goal of the kaizen event. Solicit feedback following the kaizen event from not only the team members but also the non team-members and use this feedback to continuously improve the kaizen event process.

Kaizen events should be selected based on careful consideration of the projected topic. Not only may a kaizen event not reach its full potential if the scope is too broad or complex, but the climate of continuous improvement could be negatively impacted and employee morale may deteriorate. Recognize that not all problems are appropriate for a kaizen event. Develop a process to evaluate each project to determine the appropriate type and duration of the lean initiative. Some projects may require fewer resources and time to address, while others may need significant managerial support.

Train an internal facilitator as soon as possible to run kaizen events that employ basic lean techniques. If the tools utilized in the kaizen event are not complex, significant training is not necessary. This research suggested that kaizen events are most effective if the simplest lean tools possible are employed, reinforcing previous research (Laraia et al., 1999). Do not allow the facilitator to participate actively and frequently in the decision-making during the kaizen event. Stress the importance of employee involvement of team members as well as non team-members.

Develop a team selection process that incorporates key stakeholders and selects as many of the workers in the targeted area as possible. Conduct follow-ups after the kaizen event by reviewing the incorporated changes on a monthly basis for up to one year. Understand that just as a well-conceived, well-run kaizen event can positively influence the lean climate, a poorly developed, poorly executed kaizen event can negatively influence the lean climate.

### **Scholarly Contributions**

To my knowledge, this is the first empirical study to examine the impact of employee involvement on kaizen event outcomes using multi-mode data collection and analytical methods. This empirical investigation supports what other researchers have suggested; kaizen event performance gains often backslide once the kaizen event has ended and the team has dissolved (Dale, 1996; Kaye & Anderson, 1999; Griffiths, 1998). However, this research goes one step further and explores why this regression occurs.

The results in this study on kaizen events reinforce previous findings in the lean production literature. Yasin et al. (1997) attributed lean failure to managerial reluctance to encourage employee involvement. In this study, there was a similar phenomenon discovered. In many cases the managers believed they were involving the employees, when in fact they were focusing only on the team members and not the workers in the targeted areas. Other researchers suggested that organizations do not reap all the benefits of a lean system if only some of the lean tools are utilized (Clode, 1993; Gilbert, 1990; Liker, 2004). This research found that many of the organizations were instituting only kaizen events without consideration of the overarching lean philosophy and therefore continuous improvement following the kaizen event was often halted.

### **Limitations**

This research had several limitations that need to be considered. First, the research relied on self-reported data in both the surveys and interviews. Thus the data is



primarily subjective in nature and may be variable because of all the different perspectives and experiences of the people answering questions. In summarizing over 100 hours of interview data, the researcher also imposed a level of subjectivity. To partially combat this level or risk, a triangulation method was employed. In addition to collecting survey data, interviews were conducted and observations were made at each of the organizations. In several of the organizations, participants' interpretation of the survey questions was questionable considering that some respondents had limited facility with the English language.

Second, the cross-sectional field study involved data collection at three different points in time, but dissimilar information was gathered at each visit to the organization. The data was not examined longitudinally and therefore cause/effect relationships could not be identified with certainty. Future research needs to measure the climate of continuous improvement, the motivation to continuously improve, and the attitudinal variables prior to the kaizen event and immediately following the kaizen event to assess the change in these factors attributed to the kaizen event.

Third, the organizations that participated in this study were based primarily in one state and mostly manufacturing organizations. In addition, there was response-rate bias because the participants were not randomly selected. This lack of variability makes it difficult to generalize the findings to other cross-sector organizations in different stages of lean implementation across the globe.

Finally, analysis occurred both at the individual level as well as the organizational level. In some instances, the individual data had to be aggregated and assumed to represent the whole organization in the quantitative analysis.

When considering the quality of quantitative research, reliability and validity are the measures of interest. However, this research significantly relied on qualitative research and it is debatable whether a study of this nature may be replicated (Bryan & Bell, 2003). In this particular study, it would be difficult to replicate the interviews, observations, and participation, but the quantitative survey data collection and analysis could be replicated.

### **Future Research**

This research was designed to be exploratory in nature given the lack of previous empirical research on kaizen events. As a result, this research uncovered a multitude of topics related to kaizen events that need to be researched in greater detail. For example, what is the impact of levels of communication with non team-members following the kaizen event? What is the moderating role of the complexity of the lean tool on the relationship between training and the outcome? If all workers in the targeted area participated as team members in the kaizen event, would this have a positive impact on the outcomes? Do organizations that continuously improve their kaizen event processes conduct a greater number of successful kaizen events? What role do supervisors play in kaizen event sustainability? Are kaizen events necessary to achieve the intended goals? Also, for the amount of time and money those companies devote to kaizen events, could they be spending their money better?

The qualitative analysis discovered that additional research needs to address the measurement of a kaizen event's success and its sustainability. Quantifying the level of success and sustainability proved to be a fluid process for the researcher within this

study. Additional research needs to further explore all the outcomes, both performance related and the outcomes related to the climate, such as knowledge sharing and eased relations.

The collected data, in some cases, represented a combination of management's perspective, the team-member's perspective, the non team-member's perspective, the facilitator's perspective, and the researcher's perspective. For instance, the degree of kaizen event success was assessed from the team-member's perspective at the individual level and the researcher's perspective at the organizational level. Participation in decision-making was assessed using different perspectives as well. It was found that the perceived level of participation in decision-making reported by a team-member during an interview was not necessarily equal to the level of participation in decision-making as observed by the researcher. However, both the perceived level of participation in decision-making and the observed level of participation in decision-making are potentially important to the study of kaizen events. Without the qualitative element in this study (i.e. the interviews and observations) these discrepant findings would not have been discovered. In my opinion, additional research needs to address the implications of different perspectives in kaizen event factors. For example, does the perceived level of participation in decision-making influence the satisfaction with kaizen events and the motivation to continuously improve more than the actual or observed level of participation in decision-making? In future studies, the observed level of participation in decision-making perhaps could be better assessed with the use of a video camera to document the kaizen event processes.

One area in particular that demands attention is the reason why organizations want to use kaizen events. Many of the organizations in this study conducted kaizen events primarily because they had been awarded grant money. Further research is necessary to assess whether the success and sustainability of kaizen events may be positively or negatively associated with state awarded grant money and how much grant money actually drives the process.

This research investigated kaizen events located in Massachusetts. Most of these organizations' lean endeavors consisted strictly of kaizen events with no other lean initiatives in place. Additional research needs to be conducted to examine kaizen events conducted in a wide range of organizations across the country with varying degrees of lean implementation and to look at how these integrate with other improvement techniques. It would also be worthwhile to investigate the organizations that have abandoned kaizen events entirely.

I anticipated that this research would find that appropriate kaizen event training would be positively related to kaizen event performance gains and a climate of continuous improvement. Instead, no significant relationship was identified. The quality, duration, and complexity of kaizen event training before, during, and after a kaizen event need to be studied further.

The quantitative element of this study should be replicated in organizations across the nation with varying degrees of lean implementation. It would be difficult to replicate the researcher's assessment of success and sustainability, given the high degree of subjectivity, but the hypotheses at the individual level could be examined in a larger study across a broader sample using the survey instrument.

Researchers from the AME recommended that kaizen events be narrow in scope and scheduled carefully in a sequence that promotes flow within a process (Laraia et al., 1999, p. 225). Additional research needs to investigate the effectiveness of carefully sequencing kaizen events throughout a process compared to scheduling kaizen events with little to no consideration of the scope and the impact on the overall process or organization. Jeffrey Liker also stressed that running multiple kaizen events focused on targeted problems without consideration of the value stream is problematic (Liker, 2004).

This research not only examined factors that lead to successful kaizen events, but it also explored involvement processes imbedded within kaizen events that potentially impact employees' general motivation to continuously improve and an overall climate of continuous improvement. This research touched upon the impact that kaizen events may have on a climate of continuous improvement and thus, their role in a broader lean initiative. However, many questions pertaining to the causal relationships remain unanswered. For example, do kaizen event processes and outcomes impact the climate of continuous improvement, or does the climate of continuous improvement impact the kaizen event processes and outcomes? More than likely, this is a reciprocal relationship. Additional research needs to be conducted in order to fully address the role that kaizen events play in a broader lean initiative and to examine whether kaizen events truly advance an organization's overall lean climate.

This dissertation reviewed the literature dedicated to idea systems, another continuous improvement initiative. Idea systems and kaizen events have been compared and contrasted in this study, but additional research needs to be conducted to compare the sustainability of improvements achieved in both types of initiatives.

## APPENDIX A

### INTERVIEW QUESTIONS

#### Organizational Data Questions – Interview with management

- What is the size of the company?
- What is the ownership structure?
- Is the workforce union or non-union?
- How would you describe the organizational structure? (Vertical/horizontal)?
- What is the strategy of the company?
- Do you have a mission statement? If yes, what is it?
- Is the industry high tech, low tech, or service?
- Have there been any layoffs in the past? Will there be any in the foreseeable future?
- What is your turnover rate?
- Do you have a bonus system? Could you describe it?
- Do you have an idea system or a suggestion system?
- Do you currently have any other lean initiatives? If yes, how were they conducted? What kind of training took place?
- How many previous kaizen events have you held?
- Do you have any previous experience with kaizen events?
- How did you find out about kaizen events?
- Where is the organization going and how does kaizen events fit in the overall picture?

#### Kaizen Event Exploratory Questions – Daily Interviews with the Facilitator, Team members, and Employees from the Targeted Area

- What type of training have you received today?
- What are the goals of this kaizen event?
- Do you feel that your input will make a difference?
- Did you have any ideas today?
- How do you feel about reducing the required number of workers in this area?  
How would you describe the atmosphere of today's events?
- Do you think there was a way to improve today's outcome?
- Are you committed to this effort?
- Are you satisfied with your job?
- Do you trust management? Do you trust the organization?

- Do you feel the organization has your best interest in mind?
- Do you respect the leaders of your organization?

### **Exhibit C. Structural and Involvement Questions – Interview with Facilitator**

#### *Structural Questions*

- Are you an outside consultant or an internal facilitator?
- What is your experience and expertise in lean and kaizen events?
- How many members were on the kaizen team?
- Were the team members selected, or did they volunteer?
- What were the organizational backgrounds of the team members?
- How was the targeted process selected?
- How long did the event last?
- How many hours each day did the event last?
- Was the process shutdown during the event? If so, for how long?
- Can I have a copy of the kaizen event schedule and any other supporting documents?

#### *Involvement Questions*

##### *Participation in Decision-making Questions*

- What opportunities were team members given to participate in decisions made during the kaizen event?
- What opportunities were non team-members given to participate in decisions made during the kaizen event?
- How were employee ideas and suggestions collected?
- After the kaizen event, were employees given the opportunity to give suggestions?

##### *Communication Questions*

- Was everyone made aware of the upcoming kaizen event prior to the kickoff?
- Were the goals of the kaizen event communicated to the employees? How and to whom?
- Following the event, how were changes communicated to the employees?
- Was there a follow-up celebration?
- Who was invited to the celebration?
- Overall, how would you describe the means of communication to team members and non team-members?

### *Training Questions*

- Did team members receive training? If yes, when and for how long?
- Was it given before, during, or after the event? Who lead the training sessions?
- What was focus of the training (5S, SMED, etc.)?
- Was the training based in a classroom or on the shop floor or somewhere else?
- Did non team-members receive training? If yes, when and to what extent?
- Was it given before, during, or after the event? What was the focus of the training (5S, SMED, etc.)?
- Was the training based in a classroom or on the shop floor or somewhere else?
- Following the event, was there training for employees directly impacted by the changes?

### **Performance Outcome Questions – Interview with Facilitator**

- What was the savings in time?
- What was the change in quality?
- What was the reduction in inventory?
- What were the cost savings?
- What was the reduction in required labor?
- What was the reduction in required floor space?
- What was the improvement in ease of job improvements?
- What were other benefits?
- In your experience, what makes for a successful kaizen event?
- What makes for an unsuccessful event?

### **Performance Outcome Sustainability Questions – Interview with Management**

- Over the last two months, did the time savings improvement achieved during the kaizen event last? Why do you think?
- Did the quality improvement last? Why do you think?
- Did the improvement in the level of inventory last? Why do you think?
- Did the cost savings last? Why do you think?
- Was the reduction in labor sustained? Why do you think?
- Was the reduction in required floor space sustained? Why do you think?
- Did the improvement in job movements last? Why do you think?
- Have other benefits been sustained? Why do you think?
- In your opinion, was your kaizen event a success or failure?
- What makes for a successful kaizen event?
- How do you feel the overall lean effort is going?
- Is your organization dedicated to a lean effort? How?



## Performance Outcome Sustainability Questions – Interview with Employees in the Targeted Process Area

- Have the performance gains achieved during the kaizen event been sustained?
- If not, why have the gains not been sustained?
- If yes, why do you believe the changes remained in place?
- Do you think the changes are all positive?
- Have there been any negative aspects to the implemented changes resulting from the kaizen event?
- What do you think management would do if fewer employees were required in this work area as a result of the kaizen event?
- Did any employees lose their jobs as a result of the changes?
- Have you been involved with any improvement efforts in the last several months?
- Has there been any training in the last several months related to the implemented changes?
- If you saw something that could be improved at work, what would you do?
- How would management handle a suggestion for improvement?
- Would you say that your organization is dedicated to becoming lean? Why or why not?
- In the past couple months have there been any lean events?
- Do you know what the company's lean goals are?
- Are kaizen events worthwhile?
- Are you more satisfied with your job now than several months ago?
- Are you more committed to your job now than several months ago?
- Do you trust management/the organization more now than several months ago?
- Has your respect for top management changed over the last several months?

## APPENDIX B

### HANDOUT FOR PROSPECTIVE PARTICIPANTS

# Kaizen Blitz Study

**Michele Burch**

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- ◆ **Purpose of the Study**
  - To determine factors that lead to the success or failure of a kaizen blitz
  
- ◆ **Why should your organization participate?**
  - Participation in this study will help you understand how to run more effective kaizen blitzes in the future.
  
- ◆ **What is involved?**
  - Interviews with a few members of management and the event facilitator
  - Surveys for event participants and employees directly impacted by changes
  
- ◆ **Background**
  - Kaizen blitzes have become a primary tool of continuous improvement for many organizations. However, the results from these events depend heavily on how they are set up and run. This study seeks to determine what works, what doesn't, and why.

## APPENDIX C

### TEAM MEMBER SURVEY

#### Survey of Kaizen Event Team Members

**This survey will assess your kaizen event experience. Be assured that all of your responses in this survey will remain confidential. Please circle the response that best describes your level of agreement with the given statement.**

**What was your role in this kaizen event?** Team member Team leader

**Do you work in the area targeted by the kaizen event?** Yes No

**If you received training for this kaizen event, please complete this section:**

**The following statements focus on the kaizen event training.**

The time between the provided training and the application of what was learned was too long.  
1 Strongly agree 2 Agree 3 Neutral 4 Disagree 5 Strongly disagree

I understood the concepts covered in the training.  
1 Strongly agree 2 Agree 3 Neutral 4 Disagree 5 Strongly disagree

The training I received for this kaizen event was highly relevant and applicable to the targeted problem.  
1 Strongly agree 2 Agree 3 Neutral 4 Disagree 5 Strongly disagree

I would have felt more prepared for the kaizen event if additional topics were covered in training.  
1 Strongly agree 2 Agree 3 Neutral 4 Disagree 5 Strongly disagree

The trainer presented the material to be learned in an interesting manner.  
1 Strongly agree 2 Agree 3 Neutral 4 Disagree 5 Strongly disagree

**The following statements focus on your participation in decision-making during the kaizen event.**

Members of the organization encouraged me to participate in decision-making during the kaizen event.  
1 Strongly agree 2 Agree 3 Neutral 4 Disagree 5 Strongly disagree

I often gave my input during the kaizen event.  
1 Strongly agree 2 Agree 3 Neutral 4 Disagree 5 Strongly disagree

I would have participated more in the decision-making, if I felt my input was truly valued.  
1 Strongly agree 2 Agree 3 Neutral 4 Disagree 5 Strongly disagree

**The following statements focus on communication.**

The organization explained kaizen events to us before we held one.

1 Strongly agree    2 Agree                      3 Neutral    4 Disagree                      5 Strongly disagree

The organization told us the reason that we were having this kaizen event.

1 Strongly agree    2 Agree                      3 Neutral    4 Disagree                      5 Strongly disagree

Management communicated, well in advance, when we would be having the kaizen event and for how long it would last.

1 Strongly agree    2 Agree                      3 Neutral    4 Disagree                      5 Strongly disagree

Prior to the kaizen event, the organization explained what my role would be during the kaizen event.

1 Strongly agree    2 Agree                      3 Neutral    4 Disagree                      5 Strongly disagree

Representatives of the organization discussed how the kaizen event might impact my job and me.

1 Strongly agree    2 Agree                      3 Neutral    4 Disagree                      5 Strongly disagree

The organization clearly and accurately communicated the goal of this kaizen event.

1 Strongly agree    2 Agree                      3 Neutral    4 Disagree                      5 Strongly disagree

**The following statements focus on continuous improvement.**

If I have an idea for improvement, I happily share my suggestion with the organization.

1 Strongly agree    2 Agree                      3 Neutral    4 Disagree                      5 Strongly disagree

I regularly look for ways to improve aspects of my job.

1 Strongly agree    2 Agree                      3 Neutral    4 Disagree                      5 Strongly disagree

I share my ideas for improvement with the organization.

1 Very often                                      2 Often    3 Sometimes    4 Seldom                                      5 Never  
(More than once a week)    (Several times a month)    (About once a moth)    (Maybe one to two times a year)

I may as well not look for improvement opportunities because management truly isn't interested in my input.

1 Strongly agree    2 Agree                      3 Neutral    4 Disagree                      5 Strongly disagree

Management strongly supports continuous improvement efforts.

1 Strongly agree    2 Agree                      3 Neutral    4 Disagree                      5 Strongly disagree

Employees in this organization truly value continuous improvement.

1 Strongly agree    2 Agree                      3 Neutral    4 Disagree                      5 Strongly disagree

**The following statements focus on the results of this kaizen event.**

The improvement goal of the kaizen event was achieved.

1 Strongly agree    2 Agree                    3 Neutral    4 Disagree                    5 Strongly disagree

If we had more time, our kaizen event team would have been able to make better recommendations.

1 Strongly agree    2 Agree                    3 Neutral    4 Disagree                    5 Strongly disagree

The scope of the improvement was too large for a kaizen event, so we weren't able to adequately address all the issues.

1 Strongly agree    2 Agree                    3 Neutral    4 Disagree                    5 Strongly disagree

As a result of this kaizen event, I have a better understanding of work outside of my job responsibilities.

1 Strongly agree    2 Agree                    3 Neutral    4 Disagree                    5 Strongly disagree

I am very behind in my regular work because I have been busy with the kaizen event.

1 Strongly agree    2 Agree                    3 Neutral    4 Disagree                    5 Strongly disagree

During the kaizen event, management disagreed with our approach to the problem and redirected our efforts.

1 Strongly agree    2 Agree                    3 Neutral    4 Disagree                    5 Strongly disagree

Management selected a kaizen team that had the appropriate skills to tackle the problem.

1 Strongly agree    2 Agree                    3 Neutral    4 Disagree                    5 Strongly disagree

By the end of the kaizen event, the team members developed a closer relationship with each other.

1 Strongly agree    2 Agree                    3 Neutral    4 Disagree                    5 Strongly disagree

Our organization did not need a kaizen event to identify these improvements.

1 Strongly agree    2 Agree                    3 Neutral    4 Disagree                    5 Strongly disagree

My participation in this kaizen event had a positive impact on the outcomes of the kaizen event.

1 Strongly agree    2 Agree                    3 Neutral    4 Disagree                    5 Strongly disagree

The facilitator came up with most of the ideas used in the proposed improvements.

1 Strongly agree    2 Agree                    3 Neutral    4 Disagree                    5 Strongly disagree

If asked, I would gladly participate in a subsequent kaizen event.

1 Strongly agree    2 Agree                    3 Neutral    4 Disagree                    5 Strongly disagree

I want the organization to keep having kaizen events.

1 Strongly agree    2 Agree                    3 Neutral    4 Disagree                    5 Strongly disagree

My coworkers want the organization to keep having kaizen events.

1 Strongly agree    2 Agree                    3 Neutral    4 Disagree                    5 Strongly disagree

I am more willing to look for improvements in my work now that I participated in a kaizen event.

1 Strongly agree    2 Agree                    3 Neutral    4 Disagree                    5 Strongly disagree

This kaizen event has brought our organization one step closer to becoming a truly lean organization.

1 Strongly agree    2 Agree                    3 Neutral    4 Disagree                    5 Strongly disagree

**The following statements focus on trust.**

I do not fully trust my employer.

1 Strongly agree    2 Agree                      3 Neutral    4 Disagree                      5 Strongly disagree

My employer is open and upfront with me.

1 Strongly agree    2 Agree                      3 Neutral    4 Disagree                      5 Strongly disagree

In general, I believe my employer's motives and intentions are good.

1 Strongly agree    2 Agree                      3 Neutral    4 Disagree                      5 Strongly disagree

I don't think my employer treats me fairly.

1 Strongly agree    2 Agree                      3 Neutral    4 Disagree                      5 Strongly disagree

I can expect my employer to treat me in a consistent and predictable fashion.

1 Strongly agree    2 Agree                      3 Neutral    4 Disagree                      5 Strongly disagree

I am confident that I will not lose my job in the near future.

1 Strongly agree    2 Agree                      3 Neutral    4 Disagree                      5 Strongly disagree

**The following statements focus on management**

I believe top management has led this organization effectively.

1 Strongly agree    2 Agree                      3 Neutral    4 Disagree                      5 Strongly disagree

Management can be trusted to make sensible decisions for the firm's future.

1 Strongly agree    2 Agree                      3 Neutral    4 Disagree                      5 Strongly disagree

Our firm has a poor future unless it can attract better managers.

1 Strongly agree    2 Agree                      3 Neutral    4 Disagree                      5 Strongly disagree

**The following statements focus on your satisfaction with this job.**

Generally speaking, I am very satisfied with this job.

1 Strongly agree    2 Agree                      3 Neutral    4 Disagree                      5 Strongly disagree

I frequently think of quitting this job.

1 Strongly agree    2 Agree                      3 Neutral    4 Disagree                      5 Strongly disagree

I am generally satisfied with the kind of work I do in this job.

1 Strongly agree    2 Agree                      3 Neutral    4 Disagree                      5 Strongly disagree

**The following statements focus on your commitment to this job.**

I am willing to put in a great deal of effort beyond what is normally expected in order to help this organization be successful.

1 Strongly agree    2 Agree                      3 Neutral    4 Disagree                      5 Strongly disagree

I would talk up this organization to my friends as a great organization to work for.

1 Strongly agree    2 Agree                      3 Neutral    4 Disagree                      5 Strongly disagree

I would accept almost any type of job assignment in order to keep working for this organization.

1 Strongly agree    2 Agree                      3 Neutral    4 Disagree                      5 Strongly disagree

I really care about the fate of this organization.

1 Strongly agree    2 Agree                      3 Neutral    4 Disagree                      5 Strongly disagree

This organization really inspires the very best in me in the way of job performance

1 Strongly agree    2 Agree                      3 Neutral    4 Disagree                      5 Strongly disagree

For me this is the best of all possible organizations for which to work.

1 Strongly agree    2 Agree                      3 Neutral    4 Disagree                      5 Strongly disagree

**How long have you worked for this organization?**

Fewer than 6 months    6 months to 1 year                      1 to 5 years    More than 5 years

**What is your age?**

Under 25 yrs    25 to 35 yrs    36 to 45 yrs    46 to 55 yrs    Over 56 yrs

**What is your gender?**    Female                      Male

**What is your highest level of education?**

High School    Associate's Degree                      Bachelor's Degree                      Graduate Degree

**Besides this one, on how many kaizen event teams have you been a member?**

None                      One other    Between 2 and 4                      Between 5 and 10                      More than 10

Please answer the following questions only if you've had previous experience with kaizen events:

**My experience with previous kaizen events is that they are always initially successful.**

1 Strongly agree    2 Agree                      3 Neutral    4 Disagree                      5 Strongly disagree

**Did the changes implemented during previous kaizen events last over the long term?**

1 Completely                      2 Somewhat    3 Not sure                      4 Not really                      5 Not at all

Please tell me why you think the changes implemented during previous kaizen events did or did not last over the long term?

**Thank you for completing this survey. If you have any comments, feel free to do so below. Please make sure that you responded to each question and return it to me, Michele Burch.**

## APPENDIX D

### NON TEAM-MEMBER SURVEY

#### SURVEY OF KAIZEN EVENT

**This survey will assess your kaizen event experience. Be assured that all of your responses in this survey will remain confidential. For each statement, please circle one response.**

**Do you work in the area targeted by the kaizen event? Yes No**

**The following statements focus on your participation in decision making during the kaizen event.**

Members of the kaizen event team asked for my input during the kaizen event.

1 Strongly agree 2 Agree 3 Not sure 4 Disagree 5 Strongly disagree

I made suggestions to the team during the kaizen event.

1 Strongly agree 2 Agree 3 Not sure 4 Disagree 5 Strongly disagree

I would have made more suggestions to the kaizen event team, if I felt my input was truly valued.

1 Strongly agree 2 Agree 3 Not sure 4 Disagree 5 Strongly disagree

**The following statements focus on communication.**

The organization explained kaizen events to us before we held one.

1 Strongly agree 2 Agree 3 Not sure 4 Disagree 5 Strongly disagree

The organization told us the reason that we were having a kaizen event.

1 Strongly agree 2 Agree 3 Not sure 4 Disagree 5 Strongly disagree

Management communicated, well in advance, when we would be having the kaizen event and for how long it would last.

1 Strongly agree 2 Agree 3 Not sure 4 Disagree 5 Strongly disagree

Prior to the kaizen event, the organization explained what would be required of me during the kaizen event.

1 Strongly agree 2 Agree 3 Not sure 4 Disagree 5 Strongly disagree

Representatives of the organization discussed how the kaizen event might impact my job and me.

1 Strongly agree 2 Agree 3 Not sure 4 Disagree 5 Strongly disagree

The organization clearly and accurately communicated the goal of this kaizen event.

1 Strongly agree 2 Agree 3 Not sure 4 Disagree 5 Strongly disagree



**The following statements focus on continuous improvement.**

If I have an idea for improvement, I happily share my suggestion with the organization.  
1 Strongly agree 2 Agree 3 Not sure 4 Disagree 5 Strongly disagree

I regularly look for ways to improve aspects of my job.  
1 Strongly agree 2 Agree 3 Not sure 4 Disagree 5 Strongly disagree

I share my ideas for improvement with the organization  
1 Very often 2 Often 3 Sometimes 4 Seldom 5 Never  
(More than once a week) (Several times a month) (About once a month) (Maybe one to two times a year)

I may as well not look for improvement opportunities because management truly is not interested in my input.  
1 Strongly agree 2 Agree 3 Not sure 4 Disagree 5 Strongly disagree

Management strongly supports continuous improvement efforts.  
1 Strongly agree 2 Agree 3 Not sure 4 Disagree 5 Strongly disagree

Employees in this organization truly value continuous improvement.  
1 Strongly agree 2 Agree 3 Not sure 4 Disagree 5 Strongly disagree

**The following statements focus on the results of the kaizen event.**

The improvement goal of the kaizen event was achieved.  
1 Strongly agree 2 Agree 3 Not sure 4 Disagree 5 Strongly disagree

My job responsibilities have changed a great deal as a result of the kaizen event.  
1 Strongly agree 2 Agree 3 Not sure 4 Disagree 5 Strongly disagree

My daily workload is much greater as a result of the kaizen event.  
1 Strongly agree 2 Agree 3 Not sure 4 Disagree 5 Strongly disagree

The kaizen event has streamlined my work.  
1 Strongly agree 2 Agree 3 Not sure 4 Disagree 5 Strongly disagree

Improvements in the targeted area will be limited because there are details about the work that the team did not consider.  
1 Strongly agree 2 Agree 3 Not sure 4 Disagree 5 Strongly disagree

The scope of the improvement opportunities was too large for a kaizen event, so all the issues weren't adequately addressed.  
1 Strongly agree 2 Agree 3 Not sure 4 Disagree 5 Strongly disagree

Overall, the kaizen event has impacted my job positively.  
1 Strongly agree 2 Agree 3 Not sure 4 Disagree 5 Strongly disagree

As a result of the kaizen event, I am more willing to look for possible improvements in my work.  
1 Strongly agree 2 Agree 3 Not sure 4 Disagree 5 Strongly disagree

This kaizen event has brought our organization one step closer to becoming a truly lean organization.  
1 Strongly agree 2 Agree 3 Not sure 4 Disagree 5 Strongly disagree

I want the organization to keep having kaizen events.	1 Strongly agree	2 Agree	3 Not sure	4 Disagree	5 Strongly disagree
My coworkers want the organization to keep having kaizen events.	1 Strongly agree	2 Agree	3 Not sure	4 Disagree	5 Strongly disagree

<b>The following statements focus on trust.</b>					
I do not fully trust my employer.	1 Strongly agree	2 Agree	3 Not sure	4 Disagree	5 Strongly disagree
My employer is open and upfront with me.	1 Strongly agree	2 Agree	3 Not sure	4 Disagree	5 Strongly disagree
In general, I believe my employer's motives and intentions are good.	1 Strongly agree	2 Agree	3 Not sure	4 Disagree	5 Strongly disagree
I don't think my employer treats me fairly.	1 Strongly agree	2 Agree	3 Not sure	4 Disagree	5 Strongly disagree
I can expect my employer to treat me in a consistent and predictable fashion.	1 Strongly agree	2 Agree	3 Not sure	4 Disagree	5 Strongly disagree
I am confident that I will not lose my job in the near future.	1 Strongly agree	2 Agree	3 Not sure	4 Disagree	5 Strongly disagree

<b>The following statements focus on management.</b>					
I believe top management has led this organization effectively.	1 Strongly agree	2 Agree	3 Not sure	4 Disagree	5 Strongly disagree
Management can be trusted to make sensible decisions for the firm's future.	1 Strongly agree	2 Agree	3 Not sure	4 Disagree	5 Strongly disagree
Our firm has a poor future unless it can attract better managers.	1 Strongly agree	2 Agree	3 Not sure	4 Disagree	5 Strongly disagree

<b>The following statements focus on your satisfaction with this job.</b>					
Generally speaking, I am very satisfied with this job.	1 Strongly agree	2 Agree	3 Not sure	4 Disagree	5 Strongly disagree
I frequently think of quitting this job.	1 Strongly agree	2 Agree	3 Not sure	4 Disagree	5 Strongly disagree
I am generally satisfied with the kind of work I do in this job.	1 Strongly agree	2 Agree	3 Not sure	4 Disagree	5 Strongly disagree

**The following statements focus on your commitment to this job.**

I am willing to put in a great deal of effort beyond what is normally expected in order to help this organization be successful.

1 Strongly agree 2 Agree 3 Not sure 4 Disagree 5 Strongly disagree

I would talk up this organization to my friends as a great organization to work for.

1 Strongly agree 2 Agree 3 Not sure 4 Disagree 5 Strongly disagree

I would accept almost any type of job assignment in order to keep working for this organization.

1 Strongly agree 2 Agree 3 Not sure 4 Disagree 5 Strongly disagree

I really care about the fate of this organization.

1 Strongly agree 2 Agree 3 Not sure 4 Disagree 5 Strongly disagree

This organization really inspires the very best in me in the way of job performance

1 Strongly agree 2 Agree 3 Not sure 4 Disagree 5 Strongly disagree

For me this is the best of all possible organizations for which to work.

1 Strongly agree 2 Agree 3 Not sure 4 Disagree 5 Strongly disagree

**How long have you worked for this organization?**

Fewer than 6 months 6 months to 1 year 1 to 5 years More than 5 years

**What is your age?**

Under 25 yrs 25 to 35 yrs 36 to 45 yrs 46 to 55 yrs over 56 yrs

**What is your gender?** Female Male

**What is your highest level of education?**

High School Associate's Degree Bachelor's Degree Graduate Degree

**On how many kaizen event teams have you been a member?**

None One other Between 2 and 4 Between 5 and 10 More than 10

Please answer the following questions only if you've had previous experience with kaizen events:

**My experience with previous kaizen events is that they are always initially successful.**

1 Strongly agree 2 Agree 3 Not sure 4 Disagree 5 Strongly disagree

**Did the changes implemented during previous kaizen event last over the long term?**

Completely Somewhat Not sure Not really Not at all

Please tell me why you think the changes implemented during the past kaizen event did or did not last over the long term.

**Thank you for completing this survey. If you have any comments, feel free to do so below. Please make sure that you responded to each question and return it to me, Michele Burch.**

## APPENDIX E

### CORRELATIONS

#### Hypothesis H1 Correlations

			Performance Gains	Sustainable	Climate of CI
Kendall's tau_b	PDM	Correlation Coefficient	.569(*)	.626(*)	.745(**)
		Sig. (2-tailed)	.025	.013	.001
		N	11	11	11
	Communication	Correlation Coefficient	.744(**)	.713(**)	.709(**)
		Sig. (2-tailed)	.003	.005	.002
		N	11	11	11
	Training	Correlation Coefficient	-.057	-.028	.432
		Sig. (2-tailed)	.837	.918	.087
		N	10	10	10
Spearman's rho	PDM	Correlation Coefficient	.658(*)	.716(*)	.882(**)
		Sig. (2-tailed)	.028	.013	.000
		N	11	11	11
	Communication	Correlation Coefficient	.857(**)	.850(**)	.836(**)
		Sig. (2-tailed)	.001	.001	.001
		N	11	11	11
	Training	Correlation Coefficient	-.100	-.086	.518
		Sig. (2-tailed)	.783	.814	.125
		N	10	10	10

		Performance Gains	Sustainable	Climate of CI
PDM	Pearson Correlation	.519	.647(*)	.801(**)
	Sig. (2-tailed)	.102	.032	.003
	N	11	11	11
Communication	Pearson Correlation	.747(**)	.781(**)	.852(**)
	Sig. (2-tailed)	.008	.005	.001
	N	11	11	11
Training	Pearson Correlation	.047	.051	.463
	Sig. (2-tailed)	.897	.889	.177
	N	10	10	10

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

**Hypothesis H1a PDM by Performance Gains**

teamstatus			Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
nonteam	Ordinal by Ordinal	Kendall's tau-b	.744	.080	5.542	.000
		Spearman Correlation	.857	.070	4.994	.001(c)
	Interval by Interval	Pearson's R	.745	.118	3.353	.008(c)
		N of Valid Cases	11			
team	Ordinal by Ordinal	Kendall's tau-b	-.066	.146	-.449	.654
		Spearman Correlation	-.125	.216	-.378	.714(c)
	Interval by Interval	Pearson's R	-.054	.168	-.162	.875(c)
		N of Valid Cases	11			

**Hypothesis H1b PDM by Sustain**

teamstatus			Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
nonteam	Ordinal by Ordinal	Kendall's tau-b	.713	.082	5.500	.000
		Spearman Correlation	.850	.067	4.839	.001(c)
	Interval by Interval	Pearson's R	.793	.104	3.906	.004(c)
		N of Valid Cases	11			
team	Ordinal by Ordinal	Kendall's tau-b	-.044	.172	-.253	.800
		Spearman Correlation	-.072	.242	-.217	.833(c)
	Interval by Interval	Pearson's R	-.002	.199	-.006	.995(c)
		N of Valid Cases	11			

**Hypothesis H1c PDM by Climate of CI**

teamstatus			Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
nonteam	Ordinal by Ordinal	Kendall's tau-b	.745	.127	5.874	.000
		Spearman Correlation	.900	.075	6.194	.000(c)
	Interval by Interval	Pearson's R	.933	.029	7.766	.000(c)
		N of Valid Cases	11			
team	Ordinal by Ordinal	Kendall's tau-b	.440	.128	3.445	.001
		Spearman Correlation	.620	.159	2.368	.042(c)
	Interval by Interval	Pearson's R	.537	.131	1.910	.088(c)
		N of Valid Cases	11			

**Hypothesis H1d Communication by Performance Gains**

Teamstatus			Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Nonteam	Ordinal by Ordinal	Kendall's tau-b	.700	.123	4.076	.000
		Spearman Correlation	.797	.124	3.964	.003(c)
	Interval by Interval	Pearson's R	.886	.064	5.746	.000(c)
		N of Valid Cases	11			
team	Ordinal by Ordinal	Kendall's tau-b	.000	.212	.000	1.000
		Spearman Correlation	-.005	.286	-.015	.988(c)
	Interval by Interval	Pearson's R	.088	.187	.266	.797(c)
		N of Valid Cases	11			

**Hypothesis H1e Communication by Sustain**

teamstatus			Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
nonteam	Ordinal by Ordinal	Kendall's tau-b	.669	.139	3.691	.000
		Spearman Correlation	.765	.136	3.568	.006(c)
	Interval by Interval	Pearson's R	.833	.092	4.516	.001(c)
		N of Valid Cases	11			
team	Ordinal by Ordinal	Kendall's tau-b	.022	.233	.093	.926
		Spearman Correlation	.040	.311	.119	.908(c)
	Interval by Interval	Pearson's R	.149	.218	.451	.663(c)
		N of Valid Cases	11			

**Hypothesis H1f Communication by Climate of CI**

teamstatus			Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
nonteam	Ordinal by Ordinal	Kendall's tau-b	.745	.127	5.874	.000
		Spearman Correlation	.864	.113	5.140	.001(c)
	Interval by Interval	Pearson's R	.880	.087	5.558	.000(c)
		N of Valid Cases	11			
team	Ordinal by Ordinal	Kendall's tau-b	.200	.192	1.039	.299
		Spearman Correlation	.327	.294	1.039	.326(c)
	Interval by Interval	Pearson's R	.308	.206	.973	.356(c)
		N of Valid Cases	11			

a Not assuming the null hypothesis.

b Using the asymptotic standard error assuming the null hypothesis.

c Based on normal approximation.

### Hypothesis H2 Correlations

			Performance Gains
Kendall's tau_b	Facilitator Expertise	Correlation Coefficient	-.032
		Sig. (2-tailed)	.912
		N	11
Spearman's rho	Facilitator Expertise	Correlation Coefficient	-.048
		Sig. (2-tailed)	.889
		N	11

		Performance Gains
Facilitator Expertise	Pearson Correlation	-.197
	Sig. (2-tailed)	.562
	N	11

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

### Hypothesis H3 Correlations

			Performance Gains	Sustainable	Climate of CI
Kendall's tau_b	Layoffs	Correlation Coefficient	.089	.146	.394
		Sig. (2-tailed)	.764	.618	.144
		N	11	11	11
	Turnover	Correlation Coefficient	.076	.151	.318
		Sig. (2-tailed)	.796	.606	.239
		N	11	11	11
Spearman's rho	Layoffs	Correlation Coefficient	.095	.158	.462
		Sig. (2-tailed)	.781	.643	.153
		N	11	11	11
	Turnover	Correlation Coefficient	.082	.163	.373
		Sig. (2-tailed)	.811	.632	.259
		N	11	11	11

		Performance Gains	Sustainable	Climate of CI
Layoffs	Pearson Correlation	.027	.188	.497
	Sig. (2-tailed)	.937	.581	.120
	N	11	11	11
Turnover	Pearson Correlation	-.052	.149	.113
	Sig. (2-tailed)	.878	.662	.740
	N	11	11	11

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

#### Hypothesis H4 Correlations

			Performance Gains	Sustainable	Climate of CI
Kendall's tau_b	No. Prev Events	Correlation Coefficient	.223	.154	-.056
		Sig. (2-tailed)	.386	.546	.814
		N	11	11	11
Spearman's rho	No. Prev Events	Correlation Coefficient	.270	.217	-.210
		Sig. (2-tailed)	.421	.521	.535
		N	11	11	11

		Performance Gains	Sustainable	Climate of CI
No. Prev Events	Pearson Correlation	.522	.351	-.009
	Sig. (2-tailed)	.099	.290	.979
	N	11	11	11

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

#### Hypothesis H5 Correlations

			Goal	CI	Climate of CI
Kendall's tau_b	PDM	Correlation Coefficient	.330(**)	.125	.420(**)
		Sig. (2-tailed)	.000	.081	.000
		N	129	128	130
	Communication	Correlation Coefficient	.384(**)	.317(**)	.464(**)
		Sig. (2-tailed)	.000	.000	.000
		N	129	128	130
	Training	Correlation Coefficient	.200	.232(*)	.224(*)
		Sig. (2-tailed)	.088	.040	.032
		N	53	54	54
Spearman's rho	PDM	Correlation Coefficient	.397(**)	.153	.540(**)
		Sig. (2-tailed)	.000	.084	.000
		N	129	128	130
	Communication	Correlation Coefficient	.466(**)	.388(**)	.577(**)
		Sig. (2-tailed)	.000	.000	.000
		N	129	128	130
	Training	Correlation Coefficient	.238	.278(*)	.279(*)
		Sig. (2-tailed)	.086	.042	.041
		N	53	54	54



		Goal	CI	Climate of CI
PDM	Pearson Correlation	.438(**)	.199(*)	.645(**)
	Sig. (2-tailed)	.000	.024	.000
	N	129	128	130
Communication	Pearson Correlation	.524(**)	.429(**)	.695(**)
	Sig. (2-tailed)	.000	.000	.000
	N	129	128	130
Training	Pearson Correlation	.288(*)	.345(*)	.278(*)
	Sig. (2-tailed)	.036	.011	.042
	N	53	54	54

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

#### Hypothesis H5a PDM by Goal Achievement

teamstatus			Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
nonteam	Ordinal by Ordinal	Kendall's tau-b	.285	.105	2.687	.007
		Spearman Correlation	.340	.124	2.892	.005(c)
	Interval by Interval	Pearson's R	.366	.127	3.146	.003(c)
		N of Valid Cases	66			
team	Ordinal by Ordinal	Kendall's tau-b	.172	.117	1.428	.153
		Spearman Correlation	.197	.134	1.568	.122(c)
	Interval by Interval	Pearson's R	.243	.131	1.956	.055(c)
		N of Valid Cases	63			

#### Hypothesis H5b PDM by Motivation to CI

teamstatus			Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
nonteam	Ordinal by Ordinal	Kendall's tau-b	.201	.104	1.932	.053
		Spearman Correlation	.242	.124	1.977	.052(c)
	Interval by Interval	Pearson's R	.240	.138	1.961	.054(c)
		N of Valid Cases	65			
team	Ordinal by Ordinal	Kendall's tau-b	-.008	.106	-.075	.940
		Spearman Correlation	-.009	.128	-.070	.945(c)
	Interval by Interval	Pearson's R	.038	.120	.298	.767(c)
		N of Valid Cases	63			

**Hypothesis H5c PDM by Climate of CI**

teamstatus			Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
nonteam	Ordinal by Ordinal	Kendall's tau-b	.514	.076	6.601	.000
		Spearman Correlation	.651	.085	6.870	.000(c)
	Interval by Interval	Pearson's R	.683	.074	7.487	.000(c)
		N of Valid Cases	66			
team	Ordinal by Ordinal	Kendall's tau-b	.187	.103	1.797	.072
		Spearman Correlation	.235	.129	1.902	.062(c)
	Interval by Interval	Pearson's R	.270	.134	2.204	.031(c)
		N of Valid Cases	64			

**Hypothesis H5d Communication by Goal Achievement**

teamstatus			Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
nonteam	Ordinal by Ordinal	Kendall's tau-b	.438	.077	5.351	.000
		Spearman Correlation	.538	.090	5.112	.000(c)
	Interval by Interval	Pearson's R	.540	.087	5.133	.000(c)
		N of Valid Cases	66			
team	Ordinal by Ordinal	Kendall's tau-b	.218	.101	2.068	.039
		Spearman Correlation	.269	.122	2.185	.033(c)
	Interval by Interval	Pearson's R	.280	.103	2.276	.026(c)
		N of Valid Cases	63			

**Hypothesis H5e Communication by Motivation to CI**

teamstatus			Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
nonteam	Ordinal by Ordinal	Kendall's tau-b	.385	.085	4.300	.000
		Spearman Correlation	.469	.104	4.216	.000(c)
	Interval by Interval	Pearson's R	.477	.109	4.306	.000(c)
		N of Valid Cases	65			
team	Ordinal by Ordinal	Kendall's tau-b	.239	.115	2.031	.042
		Spearman Correlation	.288	.135	2.351	.022(c)
	Interval by Interval	Pearson's R	.339	.130	2.815	.007(c)
		N of Valid Cases	63			

### Hypothesis H5f Communication by Climate of CI

teamstatus			Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
nonteam	Ordinal by Ordinal	Kendall's tau-b	.758	.043	16.786	.000
		Spearman Correlation	.881	.031	14.871	.000(c)
	Interval by Interval	Pearson's R	.872	.049	14.269	.000(c)
	N of Valid Cases		66			
team	Ordinal by Ordinal	Kendall's tau-b	.095	.108	.883	.377
		Spearman Correlation	.127	.139	1.011	.316(c)
	Interval by Interval	Pearson's R	.144	.152	1.150	.255(c)
	N of Valid Cases		64			

a Not assuming the null hypothesis.

b Using the asymptotic standard error assuming the null hypothesis.

c Based on normal approximation.

### Hypothesis H6 Correlations

			Job Satisfaction	Commitment
Kendall's tau_b	PDM	Correlation Coefficient	.272(**)	.214(**)
		Sig. (2-tailed)	.000	.001
		N	129	130
	Communication	Correlation Coefficient	.255(**)	.258(**)
		Sig. (2-tailed)	.000	.000
		N	129	130
	Training	Correlation Coefficient	.213	.229(*)
		Sig. (2-tailed)	.051	.026
		N	53	54
Spearman's rho	PDM	Correlation Coefficient	.354(**)	.290(**)
		Sig. (2-tailed)	.000	.001
		N	129	130
	Communication	Correlation Coefficient	.337(**)	.352(**)
		Sig. (2-tailed)	.000	.000
		N	129	130
	Training	Correlation Coefficient	.260	.300(*)
		Sig. (2-tailed)	.060	.028
		N	53	54

		Job Satisfaction	Commitment
PDM	Pearson Correlation	.370(**)	.290(**)
	Sig. (2-tailed)	.000	.001
	N	129	130
Communication	Pearson Correlation	.318(**)	.379(**)
	Sig. (2-tailed)	.000	.000
	N	129	130
Training	Pearson Correlation	.231	.300(*)
	Sig. (2-tailed)	.096	.027
	N	53	54

**Hypothesis H6a PDM by Job Satisfaction**

teamstatus			Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
nonteam	Ordinal by Ordinal	Kendall's tau-b	.288	.080	3.521	.000
		Spearman Correlation	.376	.102	3.244	.002(c)
	Interval by Interval	Pearson's R	.418	.089	3.677	.000(c)
		N of Valid Cases	66			
team	Ordinal by Ordinal	Kendall's tau-b	.314	.093	3.286	.001
		Spearman Correlation	.391	.112	3.318	.002(c)
	Interval by Interval	Pearson's R	.368	.109	3.093	.003(c)
		N of Valid Cases	63			

**Hypothesis H6b PDM by Commitment**

teamstatus			Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
nonteam	Ordinal by Ordinal	Kendall's tau-b	.287	.084	3.383	.001
		Spearman Correlation	.385	.108	3.334	.001(c)
	Interval by Interval	Pearson's R	.360	.109	3.089	.003(c)
		N of Valid Cases	66			
team	Ordinal by Ordinal	Kendall's tau-b	.136	.096	1.411	.158
		Spearman Correlation	.186	.125	1.491	.141(c)
	Interval by Interval	Pearson's R	.231	.122	1.871	.066(c)
		N of Valid Cases	64			

**Hypothesis H6c Communication by Job Satisfaction**

teamstatus			Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
nonteam	Ordinal by Ordinal	Kendall's tau-b	.246	.089	2.755	.006
		Spearman Correlation	.329	.112	2.787	.007(c)
	Interval by Interval	Pearson's R	.309	.104	2.603	.011(c)
		N of Valid Cases	66			
team	Ordinal by Ordinal	Kendall's tau-b	.265	.093	2.807	.005
		Spearman Correlation	.344	.116	2.859	.006(c)
	Interval by Interval	Pearson's R	.345	.103	2.873	.006(c)
		N of Valid Cases	63			

### Hypothesis H6d Communication by Commitment

teamstatus			Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
nonteam	Ordinal by Ordinal	Kendall's tau-b	.322	.081	3.955	.000
		Spearman Correlation	.427	.106	3.779	.000(c)
	Interval by Interval	Pearson's R	.419	.086	3.693	.000(c)
		N of Valid Cases	66			
team	Ordinal by Ordinal	Kendall's tau-b	.207	.093	2.205	.027
		Spearman Correlation	.281	.122	2.308	.024(c)
	Interval by Interval	Pearson's R	.346	.108	2.902	.005(c)
		N of Valid Cases	64			

a Not assuming the null hypothesis.

b Using the asymptotic standard error assuming the null hypothesis.

c Based on normal approximation.

### Hypothesis H7 Correlations

			Goal	Motivation to CI	Climate of CI
Kendall's tau_b	Trust	Correlation Coefficient	.391(**)	.242(**)	.424(**)
		Sig. (2-tailed)	.000	.001	.000
		N	131	130	129
	Jobsecurity	Correlation Coefficient	.372(**)	.139	.287(**)
		Sig. (2-tailed)	.000	.070	.000
		N	130	130	128
	Respect for Mgmt	Correlation Coefficient	.321(**)	.258(**)	.363(**)
		Sig. (2-tailed)	.000	.000	.000
		N	131	130	129
Spearman's rho	Trust	Correlation Coefficient	.460(**)	.282(**)	.539(**)
		Sig. (2-tailed)	.000	.001	.000
		N	131	130	129
	Jobsecurity	Correlation Coefficient	.419(**)	.157	.360(**)
		Sig. (2-tailed)	.000	.074	.000
		N	130	130	128
	Respect for Mgmt	Correlation Coefficient	.377(**)	.302(**)	.462(**)
		Sig. (2-tailed)	.000	.000	.000
		N	131	130	129

		Goal	Motivation to CI	Climate of CI
Trust	Pearson Correlation	.491(**)	.330(**)	.575(**)
	Sig. (2-tailed)	.000	.000	.000
	N	131	130	129
Jobsecurity	Pearson Correlation	.379(**)	.166	.371(**)
	Sig. (2-tailed)	.000	.059	.000
	N	130	130	128
Respect for Mgmt	Pearson Correlation	.419(**)	.306(**)	.540(**)
	Sig. (2-tailed)	.000	.000	.000
	N	131	130	129

### Hypothesis H7a Trust by Goal Achievement

teamstatus			Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
nonteam	Ordinal by Ordinal	Kendall's tau-b	.497	.073	6.369	.000
		Spearman Correlation	.598	.083	6.105	.000(c)
	Interval by Interval	Pearson's R	.589	.084	5.965	.000(c)
	N of Valid Cases		69			
team	Ordinal by Ordinal	Kendall's tau-b	.166	.121	1.362	.173
		Spearman Correlation	.189	.140	1.491	.141(c)
	Interval by Interval	Pearson's R	.163	.176	1.277	.207(c)
	N of Valid Cases		62			

### Hypothesis H7b Trust by Motivation to CI

teamstatus			Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
nonteam	Ordinal by Ordinal	Kendall's tau-b	.378	.092	3.973	.000
		Spearman Correlation	.450	.109	4.097	.000(c)
	Interval by Interval	Pearson's R	.478	.125	4.422	.000(c)
	N of Valid Cases		68			
team	Ordinal by Ordinal	Kendall's tau-b	.080	.121	.661	.508
		Spearman Correlation	.085	.144	.659	.512(c)
	Interval by Interval	Pearson's R	.054	.164	.423	.674(c)
	N of Valid Cases		62			

### Hypothesis H7c Trust by Climate of CI

teamstatus			Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
nonteam	Ordinal by Ordinal	Kendall's tau-b	.435	.084	5.120	.000
		Spearman Correlation	.556	.099	5.346	.000(c)
	Interval by Interval	Pearson's R	.587	.096	5.795	.000(c)
	N of Valid Cases		66			
team	Ordinal by Ordinal	Kendall's tau-b	.434	.086	4.980	.000
		Spearman Correlation	.536	.104	4.962	.000(c)
	Interval by Interval	Pearson's R	.561	.101	5.293	.000(c)
	N of Valid Cases		63			

#### Hypothesis H7d Job Security by Goal Achievement

teamstatus			Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
nonteam	Ordinal by Ordinal	Kendall's tau-b	.395	.091	4.110	.000
		Spearman Correlation	.452	.103	4.145	.000(c)
	Interval by Interval	Pearson's R	.446	.104	4.081	.000(c)
		N of Valid Cases	69			
team	Ordinal by Ordinal	Kendall's tau-b	.234	.121	1.857	.063
		Spearman Correlation	.255	.132	2.023	.048(c)
	Interval by Interval	Pearson's R	.230	.128	1.813	.075(c)
		N of Valid Cases	61			

#### Hypothesis H7e Job Security by Motivation to CI

teamstatus			Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
nonteam	Ordinal by Ordinal	Kendall's tau-b	.271	.107	2.428	.015
		Spearman Correlation	.305	.120	2.600	.012(c)
	Interval by Interval	Pearson's R	.336	.126	2.899	.005(c)
		N of Valid Cases	68			
team	Ordinal by Ordinal	Kendall's tau-b	-.004	.115	-.038	.969
		Spearman Correlation	-.005	.130	-.040	.968(c)
	Interval by Interval	Pearson's R	-.067	.123	-.519	.605(c)
		N of Valid Cases	62			

#### Hypothesis H7f Job Security by Climate of CI

teamstatus			Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
nonteam	Ordinal by Ordinal	Kendall's tau-b	.301	.096	3.100	.002
		Spearman Correlation	.376	.116	3.242	.002(c)
	Interval by Interval	Pearson's R	.378	.123	3.271	.002(c)
		N of Valid Cases	66			
team	Ordinal by Ordinal	Kendall's tau-b	.216	.111	1.888	.059
		Spearman Correlation	.266	.134	2.140	.036(c)
	Interval by Interval	Pearson's R	.339	.112	2.795	.007(c)
		N of Valid Cases	62			

**Hypothesis H7g Respect for Management by Goal Achievement**

teamstatus			Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
nonteam	Ordinal by Ordinal	Kendall's tau-b	.465	.074	5.828	.000
		Spearman Correlation	.559	.084	5.518	.000(c)
	Interval by Interval	Pearson's R	.568	.084	5.655	.000(c)
		N of Valid Cases	69			
team	Ordinal by Ordinal	Kendall's tau-b	.008	.137	.056	.955
		Spearman Correlation	.007	.155	.057	.955(c)
	Interval by Interval	Pearson's R	-.037	.171	-.288	.774(c)
		N of Valid Cases	62			

**Hypothesis H7h Respect for Management by Motivation to CI**

teamstatus			Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
nonteam	Ordinal by Ordinal	Kendall's tau-b	.398	.091	4.158	.000
		Spearman Correlation	.467	.106	4.290	.000(c)
	Interval by Interval	Pearson's R	.455	.116	4.152	.000(c)
		N of Valid Cases	68			
team	Ordinal by Ordinal	Kendall's tau-b	.094	.126	.753	.451
		Spearman Correlation	.101	.145	.787	.434(c)
	Interval by Interval	Pearson's R	.055	.155	.425	.672(c)
		N of Valid Cases	62			

**Hypothesis H7i Respect for Management by Climate of CI**

teamstatus			Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
nonteam	Ordinal by Ordinal	Kendall's tau-b	.432	.083	5.070	.000
		Spearman Correlation	.555	.099	5.344	.000(c)
	Interval by Interval	Pearson's R	.618	.079	6.293	.000(c)
		N of Valid Cases	66			
team	Ordinal by Ordinal	Kendall's tau-b	.287	.098	2.909	.004
		Spearman Correlation	.369	.119	3.096	.003(c)
	Interval by Interval	Pearson's R	.387	.119	3.276	.002(c)
		N of Valid Cases	63			

a Not assuming the null hypothesis.

b Using the asymptotic standard error assuming the null hypothesis.

c Based on normal approximation.



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