IMPEDING AND FACILITATING FACTORS IN THE IMPLEMENTATION OF LEAN ENTERPRISE METHODOLOGY

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This work is dedicated to my family whose support and patience is beyond measure. The moral support of my daughter, Brianna, and wife, Betty kept me focused when the challenges seemed to outweigh the benefits of this taxing endeavor.

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ABSTRACT

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The field of lean enterprise has continued to grow since being introduced by the Toyota Corporation after World War II. In academia lean strategies are being introduced in order to prepare students for this new era in operating procedures. Currently, the majority of research in business and academia is focused on processes and methodology, but leadership strategies are yet to be fully examined.

According to Hamilton (2006) there are insufficient resources and research that contribute to understanding successful implementation strategies. Hamilton (2006) expresses concern of the lack of focus on leadership strategies and employee development in lean enterprise.

This qualitative study explores factors that impede and facilitate implementation of lean processes in business and industry. Business leaders whose organizations are implementing lean processes were interviewed. Furthermore, interviews were conducted with consultants in the field of lean enterprise. Other data was collected from document review, site visits, and observations, where feasible. Grounded theory and open coding techniques were used to sort the data according to major categories and themes. Factors were then subjected to specific statistical tests to determine the degree of relationship

between factors and successful lean enterprise implementation. Interpretation and discussion will generate a new theoretical model for lean enterprise methodology. Recommendations for future research conclude the study.

CHAPTER 1. INTRODUCTION

The field of lean enterprise has continued to grow since being introduced by the Toyota Corporation after World War II. In academia lean strategies are being introduced in order to prepare students for this new era in operating procedures. Currently, the majority of research in both academia and business is focused on processes and methodology. The amount of resources describing the mechanics of lean processes is quite extensive but is lacking in one fundamental area of business operations: leadership strategies for lean enterprise.

Understanding the basic concepts of the lean methodology is an important step but does not guarantee a successful transition to lean enterprise. As with any operating procedure, if one does not take into consideration the relationship between process and employee, performance will suffer. This research shows the unique nature of lean enterprise and the need for more effective leadership strategies – beginning with an understanding of facilitating and impeding factors in the implementation of lean methods. This research aims to make a significant contribution.

1.1 Challenges and Misconceptions

The lean enterprise environment presents numerous challenges and unique obstacles. For example, the terminology associated with lean enterprise is unique. Much of the terminology is in the Japanese language making the concepts and terminology unfamiliar in traditional business practices.

Too often businesses believe downsizing is the foundation of lean enterprise. There is a misconception lean enterprise by definition means to reduce the size of the workforce while increasing productivity. This is not a proper definition, nor is it an appropriate approach toward becoming a lean enterprise. Lean enterprise is better described by Jones & Womack (2003), as "the relentless scrutiny of every activity along the value stream—that is, asking whether a specific activity really creates any value for the customer" (Jones & Womack, 2003:36). Therefore, the assumption lean is established by reducing the workforce is not only an ineffective approach, but also leads the workforce in general to equate lean with job loss. The perceived threat of job loss leads to fear among the workforce.

Employee motivation may be affected in numerous ways. In addition to fear and confusion, employees must also make personal sacrifices. During a transition to lean processes jobs in all layers of the organization are redesigned to support the new system. The functions, in which employees are familiar and, in many cases, have developed a high level of expertise, are redesigned or occasionally eliminated. The scope of one's responsibilities is broadened and may include unfamiliar functions (Jones and Womack, 2003).

Understanding of lean methodology should be supported by an understanding of employee behavior and how it relates to the lean environment prior to development of leadership and training strategies (Ohno, 1998).

1.2 Statement of the Problem

Due in part to the fact businesses now compete within a more global economy the ability to decrease costs while increasing quality is a constant concern for business leaders worldwide. To address these issues, many businesses in the United States are attempting to implement lean methods. While much effort is expended in developing processes, tooling, and technology to support lean strategies, there is one very important business consideration that has not been thoroughly researched – the human element in the lean implementation process.

This research is also designed to determine whether or not leadership strategies and training programs are effectively preparing employees for changes they will face in lean enterprise. Developing effective leadership strategies requires an understanding of how workers perform under given circumstances.

Historically, with each transformation in industry there come new approaches toward leadership. For example, as manufacturing shifts from economies of scale and mass production to just-in-time (JIT) systems, the employee's responsibilities are transformed. They are no longer expected to produce products as quickly as possible, which creates inventory waste. Instead, employees are to produce products as demanded by the customer deliver them just-in-time for use.

Additionally, leadership roles, organizational structure, and job design are changing in order to be aligned with the latest practices in industry. However, with the latest advancement in industry, lean methods, there is little data on how the workforce is affected and how traditional leadership practices are meeting the new challenges. There is a growing need for more information on specific leadership strategies that enable a successful lean initiative. According to Jones and Womack (2003), many organizations attempting the transition to lean processes fail. They state much of this can be attributed to a demoralized workforce and a lack of effective leadership methods. One would assume business leaders would react much faster to the changing needs of employees and the organization, but this has not been the case with the introduction of lean methods. Business leaders are ineffectively attempting to address new challenges and obstacles with outdated leadership practices.

The transition to lean processes is an extensive effort requiring a restructuring of the entire organization – requiring a complete transformation. As described by Davis & Standard (1999):

Quite simply, lean manufacturing is a production philosophy, a fundamentally different way of thinking about manufacturing. It is an entirely different way of conceptualizing the entire production stream from raw material to finished goods and from product design to customer service. (p.50)

Given the magnitude of this change, it is surprising more research does not exist on leadership practices and training programs. Although lean processes and methods are

well documented, information on the human response to the lean enterprise environment is lacking. In order to develop leadership strategies to successfully implement lean processes, one must first understand the effect this transition has on the employees.

1.3 Significance of the Study

The decision to research the lean enterprise environment is motivated by the need to understand how employees react to organizational change brought on by lean implementation and to bridge the gap between theory and application. There is an abundance of material related to the actual processes and mechanics but little has been done to address the needs and motivational factors of employees as their company makes the transition to lean enterprise. A major component in leadership is the ability to properly train and motivate employees. An underlying premise of this research is these facets of leadership have not been given proper attention in the context of lean processes. This research seeks to deepen our understanding of this complex issue and how it relates to the development of effective leadership and training strategies, as well as methods of implementing lean enterprise processes. Currently, overemphasis on the mechanics of lean enterprise in academics and industry is resulting in limited understanding of the employee's perspective. While many understand lean applications, procedures, and methodology, limited information is available to business leaders seeking to prepare employees and leaders for the transition to lean enterprise. Leaders must be capable of effectively preparing employees for a lean transformation. Without an understanding of human behavior in such a unique environment, a lean initiative may be counterproductive.

1.4 Statement of the Purpose

The purpose of this research is to examine factors that both facilitate and impede the implementation of lean enterprise methodology. This study focuses on factors which directly affect the employee's ability to embrace the lean philosophy and enables one to succeed, as well as those which cause resistance and prevent a successful transition. For the purpose of this study, the terms "lean processes", "lean enterprise methodology", and "lean methods" are considered synonymous.

Additionally, this research examines common implementation practices to determine the degree of employee preparation for the new methods. Since employee resistance has historically been an obstacle during implementation, common implementation plans are compared to existing learning theories to assess whether or not employee resistance can be decreased through the use of improved training programs.

Based on the findings and corresponding conditions, this research seeks to determine if there are training needs that still need to be addressed. This contribution to the field of lean enterprise will further prepare managers to make and maintain the transition to lean methods. The findings can also be utilized in academia to prepare future leaders and managers for the difficult task of succeeding in a highly competitive lean environment.

A well designed change model unique to lean enterprise may be very beneficial as well; however, in the opinion of the researcher, one must first identify specific factors

that facilitate and impede the transition to lean. By identifying specific factors, one can then begin the task of developing a change model.

1.5 Definitions

enterprise: "something undertaken; a project, mission, or business" (Morehead, 1995)

expert: "one especially skilled or learned; an authority" (Morehead, 1995)

five s (5S): "five related terms beginning with an S, describing workplace practices conducive to visual control and lean production"

implementation: "the act of enacting; execution" (Morehead, 1995)

kaizen: "continuous improvement of an entire value stream or an individual process to create more value and less waste" (Marchwinski and Shook, 2004)

lean: "a business system for organizing and managing product development, operations, suppliers, and customer relations that requires less human effort, less space, less capital, less material, and less time to make products with fewer defects to precise customer desires, compared with traditional management" (Marchwinski, 2007)

method: "systematic procedure; a plan or system of conduct or action" (Morehead, 1995)

methodology: "a system of methods" (Morehead, 1995)

practitioner: "one engaged in a profession" (Morehead, 1995)

trainer: "one who trains others: (Morehead, 1995)

1.6 <u>Assumptions</u>

- Business leaders and consultants surveyed for this study have experience and/or knowledge of lean enterprise methodologies.
- 2. Business leaders and consultants surveyed were involved in the adoption of lean processes in an organization from the point of initial discussions through the implementation period.

1.7 Limitations and Delimitations

This research examines factors which impede or facilitate implementation of lean enterprise methodology; particularly in terms of human behavior, training, and leadership strategies. Lean engineering methods will not be examined. Also, beyond the scope of this project is the development of step-by-step training procedures for implementing lean methods. This research is designed to identify common strengths and weaknesses in the current method of implementing lean enterprise methods if any exist. With this new body of knowledge organizational leaders can address these challenges through the development of improved training programs and implementation methods.

Lean enterprise is frequently referred to as lean manufacturing. But this is incorrect, since lean processes are not industry specific and concepts are generally applicable to all industries; therefore, findings from this study are generalizable to businesses and industries considering adoption of lean methods.

CHAPTER 2. REVIEW OF THE LITERATURE

2.1 Pioneers of Lean Philosophy

The field of lean methodology began with the Toyota Production System (TPS) according to Liker (1998). Toyota was inspired by Henry Ford. Ford may have presented ideas that motivated Toyota to develop lean processes but he did not implement lean processes himself. In fact, the two terms lean methodology and TPS are used interchangeably in industry today. Despite the fact United States (U.S.) firms only recently began to adopt the philosophy, lean enterprise techniques have been in existence for many decades.

Taiichi Ohno, of Toyota, pioneered lean methodology and a limited few, such as Lean Enterprise Institute President, James P. Womack, worked with Toyota to share this new philosophy with the world. The first widely known publication on lean enterprise was authored by Jones, Roos, and Womack (1990). This is a definitive publication on lean concepts and methodology in the automotive industry. This publication gained popularity quickly as Toyota became a force to be reckoned with in the automotive industry. Womack has gone on to publish numerous books on lean enterprise, but the

emphasis in these works is related to methodology, tools, mechanics, and basic concepts.

Little is presented in current publications on lean enterprise as far as employee development or leadership strategies. He refers repeatedly to employees and managers becoming customer-driven, but effective training methods and leadership approaches are yet to become a top priority.

Shigeo Shingo, also of Toyota, published a book on lean enterprise in 1989 however it is primarily based on logistics, lean tools, and methods. It is a valuable tool for those wishing to understand lean enterprise but it lacks the human resource and leadership aspects. Ohno's work, on the other hand does refer to leadership but not in a way that is accepted in our culture. Ohno was a very forceful leader and it is reflected in his book. He claimed leaders in U.S. firms need to be more aggressive and force changes on employees and managers (1988). He was well known for telling employees and managers to "just do it" (Balle and Balle, 2005). While consulting for other firms he instilled fear among employees and often demanded top managers be fired immediately. Ohno's forceful and unforgiving approach soon became known as the "Oh No" method. When Ohno entered a facility, employees and managers alike would cry "Oh No"; hence the "Oh No" method was adopted. Ohno's forceful approach is accepted and highly successful in Japan, but U.S. firms are generally not so tolerant and open to new approaches.

2.2 Education and Culture

Many of Ohno's ideas were embraced in Japan, while U.S. firms are reluctant even today. Much of this is based on cultural differences. For example, the Japanese

education system is more conducive to success in lean enterprise. Teamwork, problem solving, and kaizen, critical elements of lean enterprise, are taught to Japanese children at a young age. According to Liker (1998), "Japanese children from kindergarten on learn to work in small groups, solve problems, follow standardized procedures, document their processes, improve their processes, collect and analyze data, and most importantly, self-manage within a peer group" (p28). Therefore, the students are more prepared and receptive to lean methodology when they enter the workforce: more so than in the U.S.

Liker (1998) goes on to further explain advantages of the Japanese education system. Liker states:

The Japanese graduate who enters the work force is able to think in the long term and to set long-term goals. He or she is naturally trained to continually evaluate and improve the progress toward these goals, and is willing to expend monumental, continuous effort to move forward. Stepping into a Japanese-run factory using lean manufacturing is almost a seamless extension of what the Japanese worker has been learning and doing since kindergarten. For Americans who have not been intensively socialized through most of their lives in this way, the concepts necessary for kaizen are neither deeply ingrained nor easily understood, particularly if they have worked for some years in a traditional company managed by top-down management. (p99)

Therefore, U.S. firms are at a disadvantage when implementing lean techniques.

Our education system and socialization processes do not instill attitudes and values conducive to the lean enterprise environment.

2.3 Success Rates

Many U.S. organizations face limited success in making the transition to lean enterprise. Liker (1998) observed only three in seven firms attempting a transition to lean methods experienced any degree of success. According to Rubrich (2004), recent studies have shown, of the firms that claim to be lean, only five percent are truly lean. Considering the historical improvements resulting from lean methods it would be incorrect to claim lean techniques are ineffective. The benefits of lean processes are well documented by Jones, Roos, and Womack (1990). Yet U.S. firms are often perplexed at their lack of success. After all, U.S. firms are also utilizing the same technologies and similar processes as lean Japanese firms. This research also examines the lack of research related to employee acceptance lean enterprise. In addition, research has noted a scarcity of lean enterprise experts. Liker (1998) describes in lean methodology there are no experts, only those with more experience.

2.4 Training and Communication

When approaching this topic from a training perspective, a number of concerns have been identified related to implementing lean techniques. Blanchard & Thacker (2004) stated language is an important element of training. Unfamiliar terminology must be defined prior to beginning any intensive training program. This becomes an interesting problem. According to Liker (1998) the concepts and terms associated with lean enterprise are primarily in the Japanese language. Liker then explains how

translation for U.S. firms is highly complicated because many of the terms cannot be precisely translated to the English language.

For example, the Japanese word jidoka, which is a key element in lean enterprise, is not precisely translatable. The term jidoka must instead be explained as a new concept rather than a word because when translated to the English language there are multiple definitions. It has been translated as autonomation, built-in quality, the quality principle, respect for humans, and automation with a human touch (Liker, 1998). With so many possible variations in translation it is extremely difficult to establish an agreed-upon language associated with lean enterprise.

Based on a study by Ragan & Smith (2005) the use of an agreed-upon and familiar language is critical and should be addressed at the onset of a training program. This issue has not been addressed as an important part of lean training programs, yet is clearly identified in the training field as highly critical.

Jones & Womack (2003) explain that a lean transformation requires a complete transformation of the organization. Considering this, it does seem more emphasis should be placed on training content and delivery including the language associated with lean enterprise.

2.5 Change Management Strategies

A change of this magnitude should also necessitate change management techniques. Standard & Davis (1999) refer to the work of Bridges (1991) who provided a detailed procedure for managing change in an organization. Standard & Davis state that applying Bridges' concepts to lean enterprise is an effective change management

approach. Bridges (1991) identified four key elements of change management which he calls the 'four p' method. These elements are as follows:

- Plan the change
- Explain the purpose
- Paint a picture
- Give everyone a part to play

Planning the change and explaining the purpose are critical in the process of becoming a lean enterprise. Explaining the purpose of a lean transformation may decrease fear and resistance. Planning the change also includes clarification of terms and concepts. Neither Bridges nor Standard and Davis address the issue of clarifying terms and concepts. However, this critical element of training should not be omitted from the planning phase of a lean transformation.

2.6 Fears and Misconceptions

Liker (1998) addresses the misconception that lean enterprise leads to job loss.

Liker's work introduced the fact this misconception contributes to resistance but this has yet to be quantified.

Each of the lean enterprise authors cited in this study do an excellent job of describing how employee responsibilities and job functions are redesigned.

Liker also goes on to describe the restructuring of the organization. According to Liker (1998), top-down management must be replaced with bottom-up management with employees self-managing teams. Employees assume much of the leadership role in a lean environment. Layers of middle management are no longer needed and top managers

must become support staff for the employees. Yet none of the authors cited describe in detail how this affects the workforce or how such a drastic change should be approached from a leadership and training standpoint.

While the difficulty of a lean transformation is described in many of these publications and many specific problems are briefly explained, the focus still appears to be on processes. Literature related to the researcher's specific interests could not be located. Therefore, developing strategies for leadership approaches and training needs in a lean environment requires the examination of literature from other fields. Literature serves as supporting material but in order to pursue this topic pertinent data must be collected through other means. Gathering data from firms which have attempted a lean transformation is the primary source of information. Applying existing change management and training publications to the lean environment will be helpful.

2.7 Objectives

The objectives of this research are to:

- Identify specific factors that facilitate and impede the implementation of lean enterprise methods
- 2. Identify best practices in the process of lean implementation

These objectives are best realized by examining existing literature, interviewing leadership personnel in lean enterprise, and interviewing lean enterprise experts.

2.8 Research Questions

This research is guided by the following questions:

- 1. What factors impede the implementation of lean methods?
- 2. What factors facilitate the implementation of lean methods?
- 3. What factors lead to employee resistance?
- 4. What training topics are effective in preparing employees for the implementation of lean methods?
- 5. In what ways can business leaders improve their approach in the implementation of lean methods?

Determining which factors impede and facilitate the implementation of lean processes will prove invaluable in industry and academia.

CHAPTER 3. METHODOLOGY

3.1 Research Design

This qualitative research study seeks to understand the factors that impede and facilitate the implementation of lean enterprise methodologies. As an exploratory study, it will gather information and data from a variety of techniques, including interviews, observations, site visits, and document review. Interviews will be conducted with business leaders whose organizations are practicing lean methods. Because it is an emerging field of study, there are relatively few renowned experts in lean enterprise philosophy and practice. Lean enterprise consultants will be interviewed as well. Also, where feasible, site visits will be conducted in which the researcher can observe lean enterprise in action.

The content of the interviews will be transcribed and examined using grounded theory and open coding approaches to data analysis. According to Haig (1995, as cited at http://www.ed.uiuc.edu/EPS/PES-Yearbook/95_docs/haig.html), a "good grounded theory is one that is: (1) inductively derived from data, (2) subjected to theoretical elaboration, and (3) judged adequate to its domain with respect to a number of evaluative

criteria." Data will be sorted according to selective criteria to reveal major categories and themes concerning impeding and facilitating factors. Using this approach, the researcher will be able to gain a better understanding of the complex factors involved in successful implementation of lean methodology. Statistical techniques will be applied to analyze the degree of relationship between the identified factors and lean enterprise methodology. This will, through further research, lead to development of new theoretical models of successful lean enterprise methodology.

3.2 Sampling Procedures

The sample for this study consists of business leaders whose organizations have successfully implemented lean processes. These are representative of the general population of business and industry leaders who have adopted lean processes. Lean enterprise consultants will also be surveyed. Both sets of surveys provide detailed information on what works and what does not in lean enterprise. Document review, site visits, and observations, where feasible, enable the researcher to gather data for comparison with information gathered from interviews.

3.3 Procedures

Surveys and notes will be transcribed and analyzed using grounded theory and open coding techniques. Data will be sorted into appropriate categories and themes, which will then be subjected to statistical tests to determine the degree to which the factors are related to successful lean enterprise methodology implementation.

3.4 Data Analysis

Analysis of data will involve coding, sorting, statistical tests, and interpretation. This will enhance understanding of the complex issues involved in implementation of lean processes with a goal toward identifying common factors that impede and facilitate the implementation of lean methods. Discussion and interpretation of data will contribute to the development of new theoretical models of lean enterprise implementation. The findings will be generalizable across business and industry because of their generic nature and because lean enterprise is not industry specific. Recommendations for future research to develop, test, and refine a lean transformation model will be made.

3.5 Grounded Theory Overview

According to Parsons (2006), grounded theory was developed by Glaser and Strauss in 1967. Grounded theory is a qualitative approach appropriate for emergence rather than hypothesis testing. This research method is suitable for semi-structured interviews, participant observation, tape recorded data, open-ended questions, and verbatim transcription of spoken words.

As such, grounded theory is the most effective method for analyzing and interpreting data collected in this research.

Parsons identified the steps in grounded theory as the following:

- 1. Data collection
- 2. Data storage

- 3. Coding
- 4. Memo writing
- 5. Outcomes

Parsons also clarified when analyzing the data, one must identify conceptual categories in data.

The features and uses of open coding, the selected method for this research, are also described ("An introduction to Grounded Theory", 2006).

Open coding is the process of selecting and naming categories from the analysis of the data. It is the initial stage in data acquisition and relates to describing overall features of the phenomenon under study. Variables involved in the phenomenon are identified, labeled, categorized, and related together in an outline form.

Given the exploratory nature of this study and the survey format, grounded theory, open data coding, and content analysis are the most appropriate methods of data collection, analysis, and interpretation.

CHAPTER 4. DATA ANALYSIS

This chapter begins by describing the population of interest, criteria for participant selection, and justification for the established selection criteria. A description of categorical data and statistical analysis is provided as well. The findings are then outlined and categorized.

4.1 Participant Selection

The population is described as individuals with relevant experience in the implementation of lean methods, proficiency in lean concepts, and a history of involvement in the facilitation of lean enterprise training programs. Participants were screened prior to being surveyed. Furthermore, upon receipt of completed surveys, specific criteria were used to determine whether or not participants were, in fact, qualified to contribute to the study.

Criteria used to select qualified participants are as follows:

 Participant must have played a significant role in leading a minimum of one lean implementation

- Participant must have participated in facilitating lean implementation employee training programs
- 3. Participant must have formal training in lean enterprise concepts

The population of interest is quite limited due to the emergent nature of lean systems in the U.S. A total of 17 surveys were collected. Of these, 14 met each criterion and were utilized for this study.

4.2 <u>Data and Statistical Analyses</u>

The data are nominal in that distinct categories are established yet order is random. Emerging categories are formed based on key phrases relevant to the context of the study. With regard to statistical analyses, measuring frequency of occurrence of data categories and distribution of data are the most effective methods of translating survey input into meaningful results. Bar charts and pie charts are appropriate for presenting frequency of occurrence of data. Histograms are used when appropriate to present distribution of data.

4.3 <u>Data Categories</u>

Categories are established based on responses to each survey item. Each survey item is shown followed by emergent categories. The survey is also listed in the Appendices as Appendix A. Survey questions, emergent categories, and brief

descriptions are shown below. Detailed category descriptions are continued in the *Conclusions* chapter.

Item 1: Tell me about the organization you work for.

Categories are tabulated based on participant's respective industry.

Table 1: Respondent Industry

Industry	Manufacturing	Consulting
Number of participants	8	6

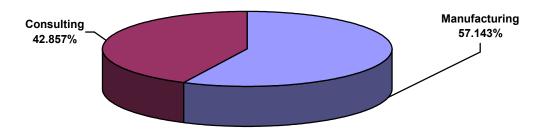


Figure 1: Respondent Industry Distribution

This survey item helps us examine any differences that may arise in different industries. If a distinction becomes clear between manufacturing faculty and consultants additional research can be recommended. Including these two groups, consultants and manufacturing professionals, enables the researcher to generalize the findings among a number of different industries. Participants from the consulting field are experienced in a variety of industries; having implemented lean methods in manufacturing, healthcare organizations, and a number of service industries.

Item 2: What is your job title?

Participant job titles are tabulated below.

Table 2: Participant Job Title

I abic 2. I ai tici	pant ood inte				
Job Title	Middle	Upper	Consultant	Continuous	Value
	Manager	Manager		Improvement	Stream
				Leader	Manager
Number of	5	2	5	1	1
responses					

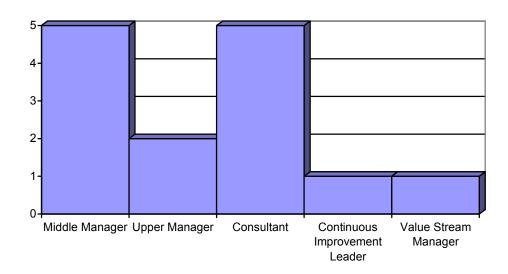


Figure 2: Participant Job Title

The participant job titles are relevant to the study in that the aim is to survey only those with sufficient experience in leading lean implementations. The majority of participants are either consultants or middle management personnel. This was a conscious decision on the part of the researcher because these groups are more likely to work closely with hourly associates and upper management personnel. As a result, input provided by the participants will be based on close observation of obstacles, benefits, and the impact on employees as well as the overall organization.

Item 3: What are your primary job responsibilities?

Participant job responsibilities are tabulated below.

Table 3: Participant Job Responsibilities

Tuble C. I all the paint Gob Itesponsionities					
Job	Production	Quality	Training	Process	Lean
Responsibilities	Planning	Management	Facilitator	Improvement	Implementation
_					Facilitator
Number of	2	2	11	1	1
Responses					

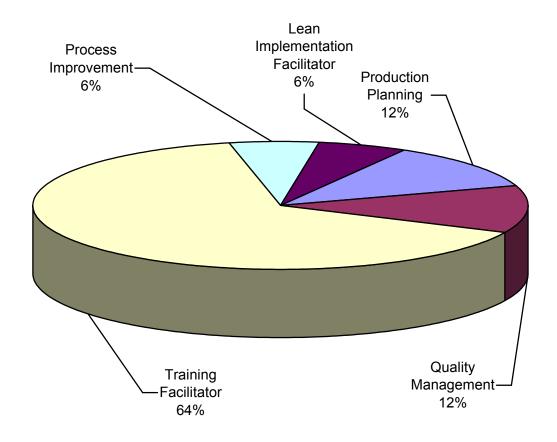


Figure 3: Participant Job Responsibilities

Item 4: What do you know about lean enterprise?

Based on responses to this survey item, the following categories have been established which represent a participant's level of knowledge in lean enterprise.

Definitions of the three categories, practitioner, trainer, and expert, are provided in the *Definitions* section of this document.

Table 4: Participant Knowledge Level

Table is Table bank Thorrouge Level				
Knowledge Level	Practitioner	Trainer	Expert	
Number of	1	4	9	
Responses				

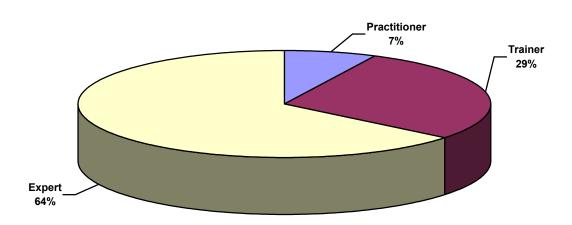


Figure 4: Participant Knowledge Level

Item 5: Tell me about your experience in lean implementations. Is there any documentation you would be willing to share?

Participant's experience in lean implementations is shown in the categories below.

Table 5: Participant Experience Level

Level of	Kaizen	Lean	Middle	Upper	Engineer	Consultant
Experience	Team	Champion	Management	Management		or
	Member					Instructor
Number of	1	2	1	2	1	7
Responses						

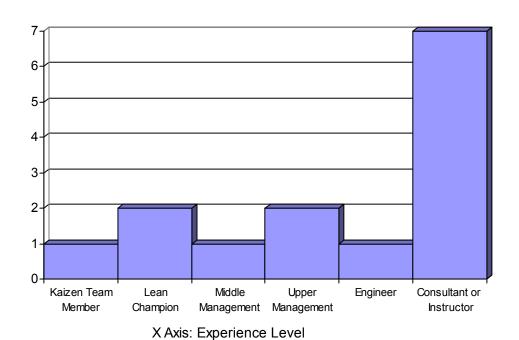


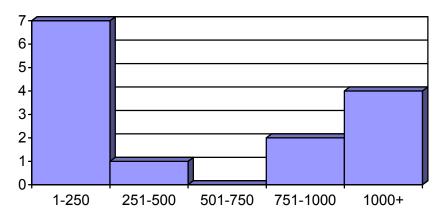
Figure 5: Participant Experience Level

Item 6: How many employees did you oversee in your largest lean implementation?

The categories below represent the participant scope of responsibility with respect to the number of employees he or she was responsible for in their largest lean implementation.

Table 6: Participant Scope of Responsibility

- was a same					
Scope of	1-250	251-500	501-750	751-1000	1000+
Responsibility					
Number of	7	1	0	2	4
Responses					



X Axis: Number of Employees Managed in Lean Implementation

Figure 6: Participant Scope of Responsibility

Item 7: Based on your lean implementation projects, how many people were involved in leading/managing the project? What were their job titles and project roles?

Item seven is a two-part question including both the number of leadership personnel involved in leading lean implementations and their respective job roles and titles. Table 7 and Figure 7 tabulate the number of leadership personnel involved where Table 8 and Figure 8 are representations of the respective job titles and roles.

Table 7: Number of Lean Implementation Leaders

Number of	0-5	6-50	51-100	101-200	200+
Leadership					
Personnel					
Number of	8	3	1	1	1
Responses					

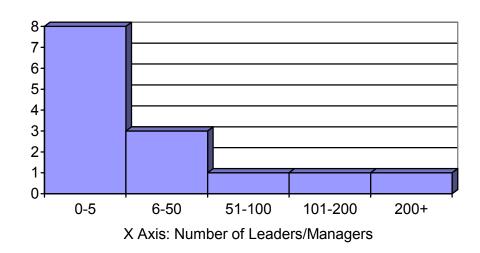


Figure 7: Number of Lean Implementation Project Leaders

Table 8: Lean Implementation Leader Job Title

Leader Job Title	Number of Responses
Engineering/Process Experts	4
Continuous Improvement/Kaizen Leaders	8
Line Worker/Hourly Associates	1
Maintenance Personnel	1
Supervisor/Foreman	4
Steering Committee Member	4
Lean Champion/Blackbelt	5
Value Stream Manager	6
Executive Staff Member	2

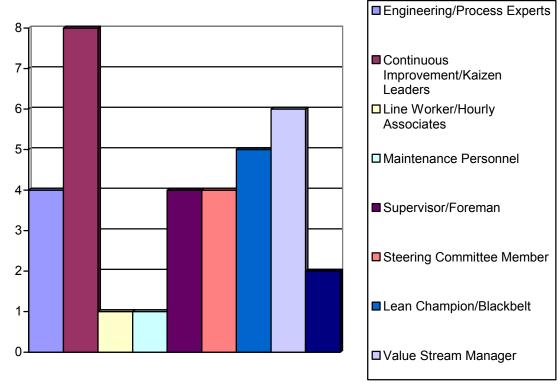


Figure 8: Lean Implementation Leader Job Title

Item 8: There has been some debate as to the amount of time required to implement lean methods. What, in your opinion, is the optimum time required for implementing lean methods?

Item eight seeks to establish an estimated timeline for the implementation of lean methods.

Table 9: Timeline Required for Implementing Lean Methods

Time	Less than	1 > 3 years	3 > 5 years	5 > 7	> 7 years	Undecided
Required	1 year			years		
Number of	1	1	4	1	2	5
responses						

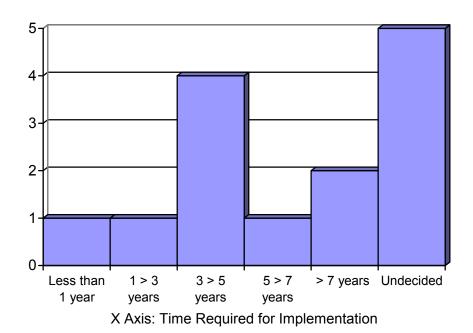


Figure 9: Timeline Required for Lean Implementation

Other relevant comments:

Listed here are other responses provided by participants to Item 8 on the survey considered relevant to this study.

One participant states, "I think there should be benefits right away with recognizable gains starting within the first six months. You are never truly finished. We are going on five years in my facility now and are still struggling with total buy-in."

Some participants claim culture is a determining factor. One participant states, "This varies from place to place and has everything to do with the culture of the organization. An organization that preaches lean but promotes employees that do not subscribe to lean techniques will never get it right."

Another participant states, "It is all dependent on the culture of the organization and the timeline for implementation will be different for each organization."

Other responses included a myriad of variables. For example one participants states,

This depends on the size of the business and business model. For large, vertically integrated organizations, the timeline for transformation is generally about 3-4 years. For a large organization that is much less vertically integrated, it can be done in about 2 years. For smaller organizations, it is usually a 1-2 year process.

Similarly, one participant states,

It truly depends on size, support, and resource allocation. The minimum it would take for a small company is a year. It doesn't take long to put the tools in place but developing the culture to truly understand the concepts of lean

can take much longer and there must be a time that passes to ensure the initiative is sustained. No two implementations are the same. Because of company size, regional differences, unions, and the level of management support, time varies from months to years. The implementation at our facility started about 5 years ago and is still in its infancy.

Another participant stated, "To do it correctly - no short-cuts, with full management support and involvement a minimum of two years is required. Realistically 3-4 years, before you start to see a return."

Item 9: Is timing a critical factor in lean implementations? Please explain your response.

Item nine of the survey addresses the issue of timing and driving factors for beginning a lean implementation.

Table 10: Importance of Timing

Yes	No	No response
9	2	3

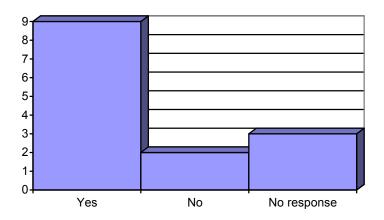


Figure 10: Importance of Timing of Lean Implementations

Table 11 lists events revealed in participant responses that helped initiate the implementation of lean methods.

Table 11: Driving Factors

Driving Event	Driven by Crisis	Driven by	New Product
		Management	Launch
		Deadline	
Number of	4	2	1
Responses			

Item 10: How did you know a lean implementation was successful?

Item ten reveals indicators of success in the implementation of lean methods. The purpose of this question is to determine if participant's respective organizations can truly be considered lean based on how they measure success.

Table 12: Indicators of Success

Response Categories	Number of Responses
Increased Profit	4
Cost of Operations	3
Improved Quality	2
Improved Delivery Times	1
Employee Satisfaction	3
Reduced Cycle Time	1
Inventory Reduction	3
Increased Productivity	3
Sales Growth	1
Employees Adopt New Philosophy	2
Reduction of waste	1
Improved Space Utilization	1

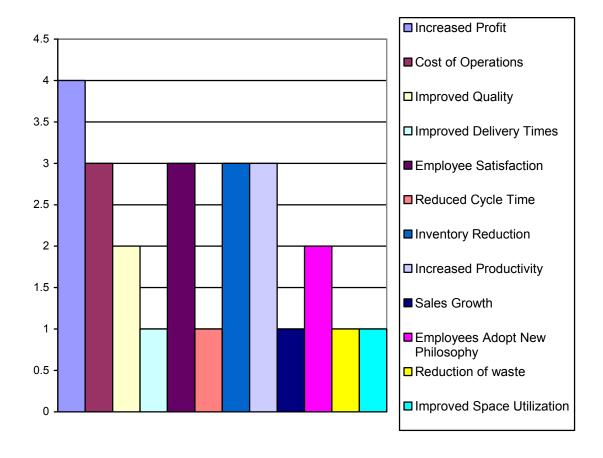


Figure 11: Indicators of Success

Item 11: How is success measured in a lean implementation?

Item 11 seeks to determine how success is measured in the implementation of lean methods.

Table 13: Lean Implementation Measurables

Response Categories	Number of Responses
Improved Customer Satisfaction	1
Increased Profit	5
Improved Quality	3
Improved Delivery Times	1
Reduced Cost of Operations	5
Reduction in Processing Steps	1
Amount of Waste Reduction	2
Reduces Cycle Time	3
Inventory Reduction	2

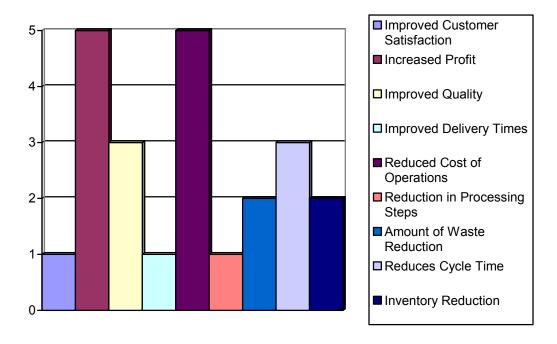


Figure 12: Lean Implementation Measurables

Item 12: What factors impede the implementation of lean?

Item 12 is designed to identify factors that impede the implementation of lean methods.

Table 14: Impeding Factors

Impeding Factors	Number of Responses
Lack of Management Support	5
Lack of Understanding	5
Resistance to Change	4
Lack of Employee Buy-In	3
Lack of Reason to Change	3
Lack of Employee Empowerment	3
Poor Communication	3
Organizational Culture	3
Lack of Training	3
Ineffective Leadership	2
Traditional Thinking	2
Bottom Line Thinking	1
Poorly Planned Implementation	1
Poor Reasoning in Management Deadlines	1
Lack of Effort	1

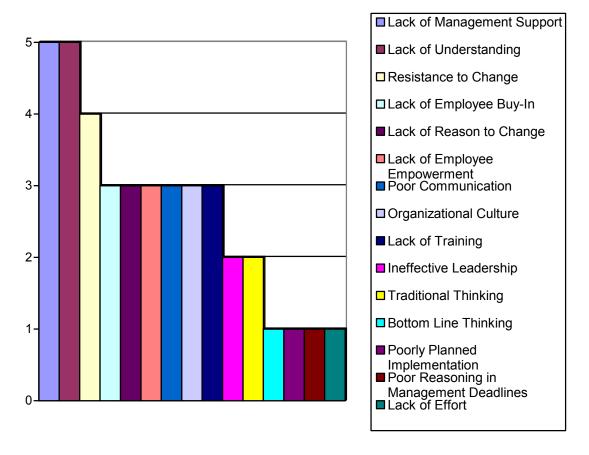


Figure 13: Impeding Factors

Item 13: What factors facilitate the implementation of lean?

Item 13 is designed to identify factors that facilitate the implementation of lean methods.

Table 15: Facilitating Factors

Facilitating Factors	Number of Responses
Support of Knowledgeable and Effective	7
Leaders	
Driven by Crisis	4
Dedicated Change Agent	4
Employee Ownership and Empowerment	4
Communication	2
Understanding Theory and Application	1
5S	1
Teamwork	1
PDCA	1
Focus on Quality	1
Visual Controls and Management	1
Terminating Resistant Personnel	1
Training in Change Management	1
Strategic Congruence	1
Supplier Involvement	1
Customer Involvement	1

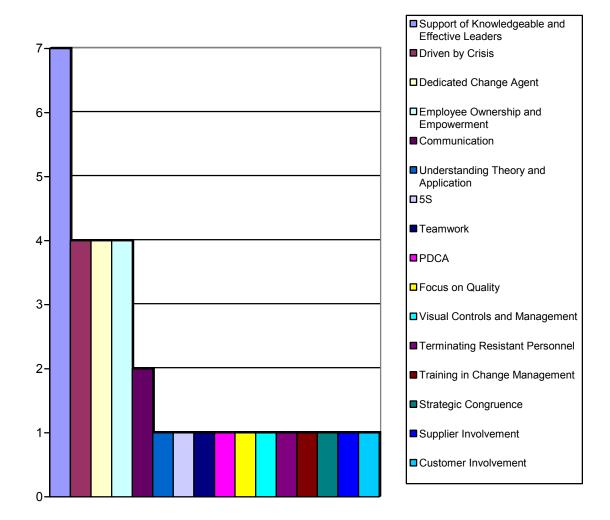


Figure 14: Facilitating Factors

Item 14: If you were to begin a lean implementation in the future what would you do differently than in previous lean implementation projects you have been involved in?

Item 14 is designed to identify implementation methods and leadership strategies participants feel can be improved based on their experience in previous lean transformations.

Table 16: Areas in Need of Improvement

Response Categories	Number of Responses
Involve and Empower Employees	3
Incremental Implementation	1
Focus on Existing Problems	1
Banish Non-Supportive Managers	1
Cross-Departmental Involvement	1
Use PDCA Model	1
Establish Appropriate Measurables	1
Top-Down Approach	1
Establish Upper Management Buy-In	1
Establish Employee Buy-In	1
Less Theory More Application	1

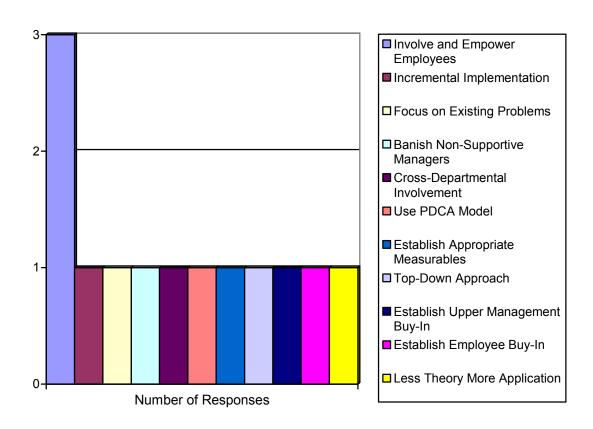


Figure 15: Areas in Need of Improvement

Item 15: What advice would you offer to persons preparing to implement lean methods?

Item 15 is designed to capture suggestions offered by participants based on their experience in lean methods thereby allowing others to develop more effective leadership strategies and methods of implementation.

Table 17: Participant Suggestions

Response Categories	Number of Responses
Get Management Support	4
Bring in an Outside Expert	3
Begin with Value Stream Analysis	3
Begin with Management Training	2
Set Reasonable Goals	1
Communicate with Employees	1
Thorough Planning before Action	1
Publicize Success	1
Utilize In-House Consultants	1
Select Appropriate Teams	1
Utilize Systems Thinking	1

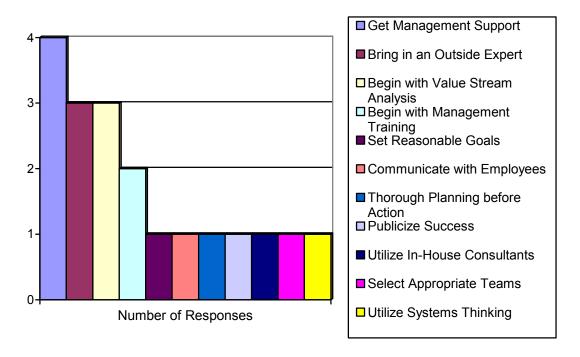


Figure 16: Participant Suggestions

Item 16: What type(s) of formal training in lean enterprise have you received?

Similar to Items 2-4, the purpose of Item 16 is to further examine participant qualifications. Participants with little or no formal training in lean methods, as well as limited experience in the implementation of lean systems, were omitted from this study.

Table 18: Participant Training Level

Level of Formal	On the Job	Company-Offered	College Courses	
Training	Training	Formal Training		
Number of 6		7	6	
Responses				

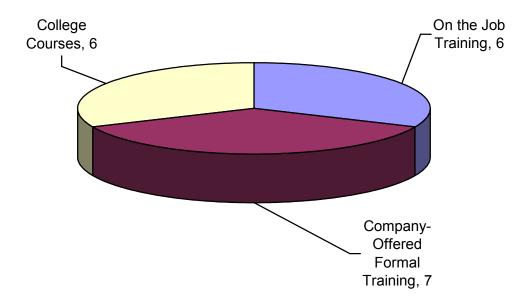


Figure 17: Participant Training Level

Item 17: Which training topics are most effective in preparing the workforce for lean methods?

The purpose of Item 17 is to identify training topics which are considered effective in preparing an organization for the implementation of lean methods.

Table 19: Effective Training Topics

Effective Training Topics	Number of Responses
Change Management	1
Kaizen/Continuous Improvement	3
Problem Solving	3
Kanban	2
Lean Principles	1
Value Stream Mapping	2
5S	4
Visual Controls	4
Standardized Work	3
Pull Systems/One-Piece Flow	4
SMED/Quick Changeover	2
Total Productive Maintenance	1
Statistical Methods	1
Types of Waste	2

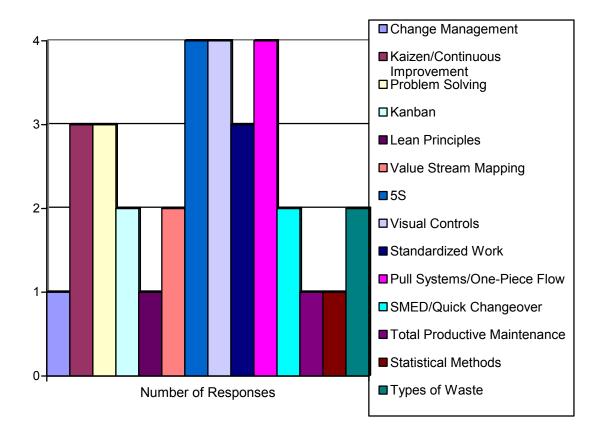


Figure 18: Effective Training Topics

Item 18: Which training topics are ineffective in preparing the workforce for lean methods?

The purpose of Item 18 is to identify training topics which are considered ineffective in preparing an organization for the implementation of lean methods.

Table 20: Ineffective Training Topics

Ineffective Training Topics	Number of Responses
Self-Directed Work Teams	1
Conventional American Systems	1
Statistical Methodology	1
Value Stream Mapping	1
5S	1

Several participants stated all topics related to lean methodology are essentially beneficial. Few respondents identified any training topics as ineffective.

One participant claims motivational speakers are very ineffective in lean methodology training. While this is considered a training method as opposed to a training topic, it is worthy of mention.

Item 19: Has resistance been an impeding factor and, if so, at what level of the organization? What factors create resistance at each level?

Item 19 is a three-part question. The purpose of Item 19 is to determine if resistance, an issue cited by many authors as impeding, has proven an obstacle to the participants. Furthermore, this survey question seeks to determine at what level(s) of the organization resistance may be an impeding factor and the cause of resistance.

No chart is needed to represent part one of this question. In response to this question all participants stated resistance is indeed an impeding factor.

Table 21, below, shows at what levels of an organization resistance is an impeding factor.

Table 21: Levels of Resistance

Level in	Hourly	First Line	Middle	Upper	All
which	Associates	Supervision	Management	Management	Levels
resistance is present					
Number of	3	0	6	5	4
Responses					

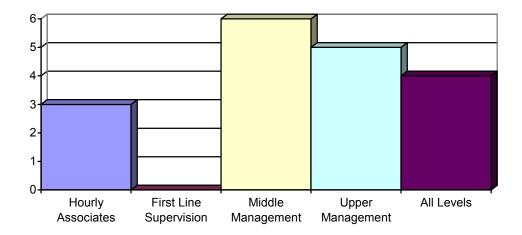


Figure 19: Levels of Resistance

In response to part three of this question, factors that cause resistance, participants offered the following responses shown in Table 22, below.

Table 22: Causes of Resistance

Cause of	Inappropriate	Lack of	Fear of	Misunderstanding	Fear of
Resistance	Measurables	Accountability	Change	of Lean	Job Loss
				Philosophy	
Number	1	1	7	8	6
of					
Responses					

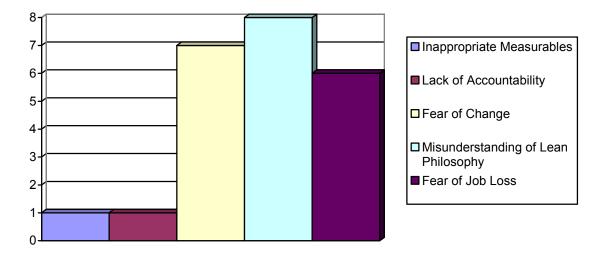


Figure 20: Causes of Resistance

4.4 Other Relevant Comments

The survey consisted primarily of open-ended questions and, as such, not all responses fit within the emergent categories. However, many comments were found to be of interest to the study and could easily support future research projects.

When asked which training topics are effective in preparing to implement lean methods one participant stated, "Avoid highly detailed training topics with the hourly personnel. It confuses people and makes it seem more difficult than it is. If employees understand the direction they will be more comfortable with the transition to lean systems."

This would imply, while training is necessary, organizations should be cautious and selective in determining what topics will best prepare the workforce for the transformation and that guidance and support may be more important than training itself.

Another participant offered insight into one of the many challenges in the implementation of lean methods. It was stated, "Unfortunately, the implementation has to take place while the business runs, and cannot be undertaken in isolation!" While this study may enable readers to develop more effective training and implementation programs other variables do exist that cannot be fully detailed in prescribed methods.

Two participants suggested cookie-cutter training programs are bound to be ineffective. The first stated,

I have not unpacked a toolbox of tools and told everyone to use them when required. Instead, I have identified the need or crisis, highlighted the problem at various levels in the organization, and then set specific goals in that area. I then allow the organization to reach a stumbling block, and then teach the tools required to address that stumbling block.

Another participant states, "Seeking cookie-cutter lean implementation programs is a sure way to fail."

Other comments described both the need for sufficient cause to change as well as implementation methods catered to fit every organization. It was stated,

Many organizations do improvement activities without really understanding them or what they are trying to achieve. They do them out of peer pressure, or an 'everyone else is doing something so we had better' mentality. They look for an off-the-shelf package to implement, expecting if they implement all of

these steps in that order, they are 'Lean' only to find they are not! At no stage has the organizational fit been considered, or the needs of the organization, or where it is in its lifetime.

This comment attests to the complexity of lean methods, a general misunderstanding of the philosophy, and unreasonable expectations of organizational leaders.

Other participants expanded upon their approach to implementing lean methods.

One participant stated, "The mandate from the executives must be in place before you even start training or speaking about a lean implementation."

Another claims, "Your game plan must be in place before you run onto the game field, or you will fail."

Two participants referred to the importance of defining terminology used in lean enterprise.

One states, "During the start up stages of implementing lean, trainees became frustrated at our failure to define the language associated with lean."

Another participant states, "People resist what they do not understand. This was especially true with much of the Japanese language used in lean manufacturing. We were basically asking our employees to learn a second language and they were not receptive until we defined the language in layman's terms. Once this was done, our employees actually enjoyed using the new lingo."

The relevance of these additional comments and the survey data are further discussed in the *Conclusions* chapter of this study.

4.6 Similar Studies

It was recently discovered the Lean Enterprise Institute (LEI) conducted research similar to this study. In July of 2007 LEI surveyed 2,500 businesspeople to determine the biggest obstacle to lean enterprise. According to Marchwinski (2007), the biggest obstacle cited in the study was middle management resistance as claimed by 36.1% of the research participants.

According to Marchwinski, the top three obstacles to the implementation of lean methods were cited as follows:

- 1. Middle management resistance: 36.1%
- 2. Lack of implementation know-how: 31%
- 3. Employee resistance: 27.7%

Each of the three factors identified in LEI's research are revealed in this study as well.

A similar study was conducted by LEI in 2006 in which Marchwinski states, "Last year, backsliding to the old ways of working was the primary obstacle to introducing lean management principles, followed by lack of implementation know-how and middle management resistance. Backsliding dropped to sixth place in this year's survey."

Similarities are found in this study. As shown in Table 21 most respondents, 33.3%, cited middle management as the most common source of resistance. To further

substantiate the findings in this study, LEI revealed other similarities such as inappropriate measurables, bottom line thinking, and a lack of crisis as impeding factors.

CHAPTER 5. CONCLUSIONS

This study is designed to enable business leaders and scholars to develop more effective leadership strategies and training programs for the implementation of lean methods by identifying factors that impede and facilitate the implementation of lean methods, an area in which little research exists but is of great interest to many. Five questions guided this study.

- 1. What factors impede the implementation of lean methods?
- 2. What factors facilitate the implementation of lean methods?
- 3. What factors lead to employee resistance?
- 4. What training topics are effective in preparing employees for the implementation of lean methods?
- 5. In what ways can business leaders improve their approach in the implementation of lean methods?

In this chapter, data is examined within the framework of these five questions.

5.1 First Research Question

The first research question asked, "What factors impede the implementation of lean methods?" Chapter four included an overview of a similar study conducted by LEI, which sought to identify the top three obstacles to the implementation of lean methods. The study by LEI identified the following three obstacles:

- 1. Middle management resistance
- 2. Lack of implementation know-how
- 3. Employee resistance (Marchwinski, 2007)

While the LEI survey findings bear similarities to this study, this exploratory study varies somewhat and identifies three primary factors, listed in order of frequency of occurrence, that impede the implementation of lean methods. The percentages listed below represent the percentage of survey participants who identified the item as an impeding factor in the implementation of lean methods, and consequently, will not typically total one hundred percent.

- 1. Lack of management support: 35.71%
- 2. Lack of understanding of lean systems: 35.71%
- 3. Resistance to change: 28.57%

While other factors are identified in survey responses these factors are the most commonly identified and are therefore, recognized as statistically significant based on frequency of occurrence.

It should also be noted, the majority of responses identified middle management as the level in which resistance was most prevalent – followed closely by upper management.

An interesting development is revealed in this list of impeding factors. If one looks beyond the top three responses to include the top nine most commonly listed survey responses it becomes apparent a number of these nine impeding factors are interrelated.

The nine impeding factors include the following:

- 1. Lack of management support: 35.71%
- 2. Lack of understanding of lean systems: 35.71%
- 3. Resistance to change: 28.57%
- 4. Lack of employee buy-in: 21.43%
- 5. Lack of reason for change: 21.43%
- 6. Lack of employee empowerment: 21.43%
- 7. Poor Communication: 21.43%
- 8. Organizational culture: 21.43%
- 9. Lack of training: 21.43%

It is the opinion of the researcher the top four most commonly occurring impeding factors can be partially remedied by addressing a portion of the less commonly mentioned factors.

Number five on this list of impeding factors, lack of reason for change, has a direct impact on the level of resistance to change. Bridges (1991) identifies a lack of reason for change as a primary source of resistance. By providing a clear cause for change there will be less resistance in the implementation of lean methods.

Number six on this list of impeding factors, lack of employee empowerment, affects resistance to change as well. Bridges (1991) also describes how involving and empowering employees reduces resistance. This is an integral part of change management.

Number seven on this list of impeding factors, poor communication, has an impact on the four most commonly reported impeding factors; lack of management support, lack of understanding lean systems, resistance to change, and lack of employee buy-in. If communication is improved employees will be less resistant and will be more likely to buy-in to the effort. Bridges (1991) contends communication is vital throughout all stages of change. Poor communication proves an overwhelming obstacle to change.

Likewise, if communication is improved, employees are more likely to learn about lean systems. By clearly communicating goals and methods, employees will learn at a faster rate.

Furthermore, if communication is improved between employees and management personnel, managers will be more likely to respond to employee concerns and needs; thereby increasing the likelihood managers will support the effort.

Number eight on this list of impeding factors, organizational culture, can create limits and obstacles throughout an organization and can significantly impact a number of these impeding factors. Lack of management support and employee buy-in are often a product of organizational culture in need of change. Changes in organizational culture are among the most difficult. However, if organizational culture does not support clear, meaningful communication, employee empowerment, and participative management, measurable and lasting change is unlikely.

The ninth item in this list of impeding factors, lack of training, is certainly a contributing factor to the perceived lack of understanding of lean systems. If more effective training programs are developed associates on all levels of an organization will have a better understanding of lean methodology and application. The development of more effective training programs can potentially enable an organization to overcome other impeding factors as well.

While these nine impeding factors are interrelated, and addressing one might in fact partially remedy another, it is not to say there are no other causes or solutions to these impediments. The fact remains, this study identifies lack of management support, lack of understanding lean systems, and resistance to change as the largest impediments to the implementation of lean methods but this study does not, however, fully examine solutions to these issues.

5.2 Second Research Question

The second research question asked, "What factors facilitate the implementation of lean techniques?"

This study identifies four primary factors, listed in order of frequency of occurrence, that facilitate the implementation of lean methods.

The percentages listed below represent the percentage of survey participants who identified the corresponding item as a facilitating factor in the implementation of lean methods, and consequently, will not typically total one hundred percent.

1. Support of knowledgeable and effective leaders: 50%

2. Driven by crisis: 28.57%

3. Presence of a dedicated change agent: 28.57%

4. Employee ownership and empowerment: 28.57%

While other factors are identified in survey responses these factors are the most commonly identified and are therefore, recognized as statistically significant based on frequency of occurrence. For a complete list of impeding factors refer to Figure 14.

The need for management support is reported as a critical facilitating factor in the implementation of lean methods. However, the responses to this survey item are more specific. Participants suggest not only a need for management support, but recommend these leaders be knowledgeable and effective. Fifty percent of survey participants identified the support of knowledgeable and effective leaders as the leading facilitating factor in the implementation of lean methods.

This would imply three things:

- 1. Leaders must be actively supportive of the entire organization
- 2. Leaders must bring to the organization experience in lean methods, or must undergo training in lean methods prior to beginning implementation
- 3. Leaders must have a proven history of effectively leading others

Leaders with these qualities are not in abundance. Requiring organizational leaders to attend training prior to implementing lean methods may result in more knowledgeable leaders, but would not necessarily make leaders more effective.

Similarly, bringing in leaders that have successfully led another firm through a lean transformation may be helpful, but this still is no guarantee of future performance. There

are simply too many variables. This might, however, be a good starting point.

Recruiting or training a leader who is actively and visibly supportive, has knowledge in lean systems, and is an effective leader might prove one of the most difficult challenges identified in this study.

Although not mentioned specifically by participants it is implied that another important quality in leaders is accountability.

Survey participants also state the implementation of lean methods must be driven by crisis. Liker (1998), Balle and Balle (2005), and Davis and Standard (1995) all support this claim. These authors state crisis should not be difficult to find, as it exists in all organizations. But crisis must be identified and should be the focal point in describing the need for change. This is also supported by the work of Bridges (1991) who stated there must be a clearly defined purpose for change. Employees must understand the urgency driving change.

This study also found the presence of a dedicated change agent to be an important facilitating factor. Jones and Womack (2003) also described the importance of having a dedicated change agent. There must be one knowledgeable and effective leader driving the change. This individual, as described by Balle and Balle (2005), should report directly to the Chief Executive Officer of the organization, must drive the change, and must be in constant and direct communication with the workforce.

This study also identifies the importance of employee ownership and empowerment. Similarly, the lack of employee empowerment is identified as an impeding factor in this chapter. Throughout this document a number of lean-related authors are cited and quite literally, all of these authors throughout their works stress the

importance of employee ownership and employee empowerment. Some authors, such as Balle and Balle (2005) and Jones and Womack (2003) describe employee empowerment as one of the most unique and critical elements of the lean philosophy. Empowering employees early on in a lean transformation will also increase buy-in and will greatly improve an organization's chances of successfully becoming a lean enterprise.

5.3 Third Research Question

The third research question asked, "What factors lead to employee resistance?"

This study identifies three primary factors, listed in order of frequency of occurrence, leading to employee resistance. The percentages listed below represent the percentage of survey participants who identified the corresponding item as causes of resistance to the implementation of lean methods, and consequently, will not typically total one hundred percent.

- 1. Misunderstanding of lean philosophy: 57.14%
- 2. Fear of change: 50%
- 3. Fear of job loss: 42.86%

While misunderstanding of the lean philosophy may be partially attributed to a lack of training which is recognized as an impeding factor, it would be inaccurate to make assumptions with regard to precise causes of this lack of understanding or what facets of lean methods are not fully understood. This study did not seek to fully examine this cause of resistance.

It can be said with a degree of certainty, though, if training programs are inadequate and ineffective employees can not be expected to fully understand lean methods. This study is part of a larger field of research intended to enable organizations to develop more effective training programs for lean enterprise. Given the high rate of failure in lean implementations described in earlier chapters, there is a need for the development of effective lean enterprise training programs.

However, as suggested by a number of survey participants, the unfamiliar terminology associated with the lean philosophy also leads to resistance and misunderstanding. Introducing new terms such as kaizen, kanban, and jidoka, for example, without definitions will prevent employee buy-in. There are a number of factors, of which only a handful are mentioned here, that cause this perceived misunderstanding of lean methodology. Future study in this area may identify the most common causes of misunderstanding lean methodology, but this is beyond the scope of this study.

Another cause of resistance is fear of change. Bridges (1991) identified this obstacle as well. By utilizing Bridges' change management techniques leaders can significantly reduce fear among employees.

Fear of job loss is another cause of resistance to the implementation of lean methods. As mentioned in earlier chapters, organizations often falsely assume the lean philosophy is based primarily on downsizing. As described in section 1.1 of this document, *Challenges and Misconceptions*, Jones and Womack (2003) better describe lean methods in terms of scrutinizing every activity throughout the value stream in order to provide the most value for the customer while generating less waste as opposed to

viewing lean methods as a means of downsizing. Unfortunately, uninformed organizations may hastily downsize only to later find their approach to lean methods was inaccurate.

Jones and Womack (2003) suggest organizational leaders implement a *no future layoff policy*. While lean implementations do occasionally require downsizing, Jones and Womack strongly suggest, if it is necessary, it is a one time downsizing event followed by a promise to keep the remaining workforce on board.

Employees must be confident they will not lose their jobs. Otherwise, the fear of job loss will prevent employee buy-in and lead to internal competition and possibly sabotage. Positive change can not occur when employees live in fear of losing their jobs.

5.4 Fourth Research Question

The fourth research question asked, "What training topics are effective in preparing employees for the implementation of lean methods?"

This study identifies six recommended training topics, listed in order of frequency of occurrence, that are beneficial in the implementation of lean methods. The percentages listed below represent the percentage of survey participants who identified the corresponding item as causes of resistance to the implementation of lean methods, and consequently, will not typically total one hundred percent.

Prior to listing and discussing these training topics it must be noted, the findings of this study should not be interpreted as an effective curriculum for training in lean methods. While participants have identified topics they feel must be included in lean

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methodology training programs, the topics discussed here should not be considered a

complete training program in and of itself.

Recommended training topics include the following:

1. 5S: 28.57%

2. Visual controls: 28.57%

3. Pull systems/one-piece flow: 28.57%

4. Kaizen/continuous improvement: 28.57%

5. Problem solving: 21.43%

6. Standardized work: 21/43%

While other factors are identified in survey responses these six factors are the

most commonly identified and are therefore, recognized as statistically significant based

on frequency of occurrence. For a complete list of impeding factors refer to Figure 18 of

this document.

One-piece flow and pull systems are often described as the foundation of lean

systems. In fact, Jones and Womack (2003) include pull systems and one-piece flow in

their five steps to becoming lean.

Other recommended training topics include the following:

• Quick changeovers: 14.29%

Types of waste: 14.29%

Kanban: 14.29%

It was also suggested by survey participants to avoid overwhelming employees

with advanced training topics; that limiting training programs to only the most basic

topics then allowing employees to learn through implementation may be the most

effective method. This appears contradictory in that a lack of training is identified in this study as a critical impeding factor.

Contradictions such as this in the findings of this study further indicates a level of uncertainty, even among experts, regarding effective lean implementation methods and training programs. In fact, while the majority of participants recommended 5S training is included in lean methodology curriculum one participant claimed 5S is not an effective training topic and should not be included in training programs. This participant is considered highly knowledgeable in the field of lean enterprise, yet disagreed with the majority of survey participants. Authors such as Jones and Womack (2003), Balle and Balle (2005), and Liker (1998) support 5S as a very effective lean tool – one of many lean tools that should be taught and utilized.

Clearly, further research is recommended in the development of lean methodology training programs. Experts in the field of lean enterprise apparently do not consistently agree on training and implementation methods. This would certainly explain inconsistent results for organizations attempting to become lean enterprises and presents further research opportunities.

5.5 Fifth Research Question

The fifth research question asked, "In what ways can business leaders improve their approach in the implementation of lean methods?"

This study identifies a number of recommendations regarding leadership strategies for implementing lean methods.

- 1. Involve and empower employees
- 2. Get management support early
- 3. Bring in an outside expert to assist in lean implementation
- 4. Begin with value stream analysis
- 5. Begin with management training

These five recommendations for improving lean implementation leadership strategies were the most common responses. Employee empowerment is repeatedly cited in this study and is a fitting response to this research question. Since a lack of employee ownership, empowerment, and buy-in are considered primary factors that impede the implementation of lean methods, organizational leaders should take this recommendation into consideration. Employees should be involved early and only through empowerment and proper training will they support the considerable changes required to implement lean methods.

Lack of management support, likewise, is identified as a primary factor impeding the implementation of lean methods. As stated by Balle and Balle (2005), management personnel must be visibly supportive. This study has confirmed the suggestions of lean-related authors cited in this document to keep on board only those leaders who actively and visibly support the effort to become a lean enterprise. Furthermore, beginning with management training prior to implementing lean methods will accomplish a couple of things.

For one, management personnel will be more likely to support the effort if they are involved early. If an organization begins a lean implementation by forcing it upon management personnel, and without training, it is unlikely they will support the effort. They may see it as a threat and resist change.

Secondly, if management personnel are trained in lean methods prior to beginning a lean implementation they will be more knowledgeable in lean systems. In section 5.2 of this document, participants were asked to identify factors that facilitate the implementation of lean methods. The most commonly cited factor was the support of knowledgeable and effective leaders. If managers are trained properly prior to implementation employees will have the support of more knowledgeable leaders.

Bringing in outside experts is also suggested by Jones and Womack (2003). Jones and Womack (2003) claim the help must come from outside in order to affect real change when implementing lean methods.

By examining the current value stream an organization can more clearly define areas in need or improvement and justify the need for lean methods.

Other relevant responses include the following:

- Communicate with employees
- Banish non-supportive managers
- Cross-departmental involvement
- Establish employee buy-in early
- Establish upper management buy-in early
- Set appropriate measurables
- Set reasonable goals
- Focus on existing problems
- Utilize systems thinking
- Publicize successes
- Select appropriate teams
- Thorough planning before taking action

While this entire list of recommendations appears solid advice, it is beyond the scope of this study to determine precisely how or to what extent these steps should be utilized. Furthermore, without further research measuring the impact of these recommendations one can not be certain of both positive and negative outcomes.

Surprisingly, two survey participants stated a top-down approach is necessary in lean enterprise but this appears contradictory. Throughout this study, participants refer to employee empowerment yet a top-down approach would imply power and control come

from the top of an organization. Liker (1998) states top-down management must be replaced with bottom-up management and self-managed teams. In the opinion of the researcher, Liker's approach is more effective in establishing employee buy-in, ownership, and true empowerment.

There must be in place a dedicated change agent who drives the change, but employees must be truly empowered if they are expected to work collectively with a team to make critical decisions on a daily basis regarding continuous improvement, which is at the core of the lean philosophy.

Comments such as this: "empower employees but practice top-down management," may reflect unwillingness on the part of leaders to share power and lose some of their leadership status.

5.6 Implications

This study did successfully identify a number of factors that impede and facilitate the implementation of lean methods and presented a number of compelling recommendations. However, a number of points in which participants disagree were also revealed. This indicates a degree of uncertainty even among experts regarding leadership strategies, training programs, and methods of implementing lean systems.

There is a genuine need for the development of more effective training programs.

Newly developed training programs must focus more on leadership strategies,

management involvement, and the needs of employees as opposed to the mechanics and
technical aspects of lean methods.

Study participants repeatedly mentioned the difficulties associated with successfully managing change. In many cases it appears business leaders have yet to make the connection between change management and the implementation of lean methods. While an abundance of publications are available in the field of change management such as the contributions of Bridges (1991) these resources are not being fully utilized.

Other challenges U.S. firms face in implementing lean methods begins with the education system. Japanese graduates, partially due to their education system, are prepared to work in teams, assume leadership responsibilities, and problem solve – all critical skills required in lean enterprise, whereas U.S. graduates have not been taught to promote a team above one's self, problem solve through teamwork, or to align individual goals with those of a team or an organization as a whole. Attitudes and values of self-promotion and individual achievement while instilled in U.S. grade-schoolers at an early age are not conducive to success in a lean enterprise. If the U.S. is to remain a global economic force change is long overdue in the education system.

Through studies such as this, significant opportunities for improvement in the education system, organizational cultures, values and attitudes, and leadership strategies can be revealed and further examined – leading to meaningful and lasting change.

5.7 <u>Future Study</u>

This study, while successfully answering the five leading research questions within the scope of this project, has created many new questions and opportunities for

research. For example, the recommendations for improving leadership strategies in section 5.5 of this document need be further examined. The impact of these recommendations can be measured in future research in order to determine if they create a measurable impact during the implementation of lean methods. One could assume, based on this study and their mention by authors cited in this document, these recommendations are effective but assumption will not lead to statistical evidence.

One could study the impact of suggested training topics listed in figure 18 of this document to determine how effectively these topics prepare the workforce for the implementation of lean methods because the fact remains; few have developed training programs and implementation strategies that effectively guide organizations through successful lean implementations.

Further research is needed in order to develop more effective training programs. As stated in section 2.3 of this study, Liker (1998) observed only three in seven firms attempting a transition to lean methods had any degree of success. According to Rubrich (2004), recent studies have shown that, of the firms that claim to be lean, only 5% are truly lean enterprises. This indicates a genuine need for further research and development.

Differences between Japanese and American education systems were presented in section 2.2 of this document which outlines certain weaknesses in the U.S. education system that do impact the ability and willingness of U.S. employees to adopt and support lean methodology. Further research in this area is suggested as well.

5.8 In Summation

Typical benefits of utilizing lean methods are well documented in a number of industries. According to Kotelnikov (2007), benefits of utilizing lean methods include the following:

- Waste reduction by 80%
- Production cost reduction by 50%
- Cycle times decreased by 50%
- Labor reduction by 50% while maintaining or increasing throughput
- Inventory reduction by 80% while increasing customer service levels
- Capacity increase by 50%

Given the numerous benefits, it is clear why the lean philosophy is growing by leaps and bounds in the U.S. However, of great concern, are the extremely low success rates of organizations attempting to implement lean methods. The U.S. is experiencing rapidly growing demand for knowledge in lean methods with but a limited few individuals and consulting firms capable of educating organizations in the art and science of lean methods. Of greater concern is that authors and those in academia are focusing on the mechanics of lean methods and few address leadership strategies and human resource issues.

The author's hopes are to build awareness among business leaders and educators there is an urgent need for the development of effective leadership strategies and training programs. The needs of the employees as well as managers are not being fully addressed

prior to and during the implementation of lean methods and most organizations are not properly prepared to implement lean methods.

Perhaps this study will stir the interests of training facilitators, business leaders, consultants, and educators alike and will provide a foundation for the development of more effective training programs and college courses designed to prepare leaders to perform in the unique and quite challenging lean environment.

GLOSSARY

enterprise: "something undertaken; a project, mission, or business" (Morehead, 1995)

expert: "one especially skilled or learned; an authority" (Morehead, 1995)

five s (5S): "five related terms beginning with an S, describing workplace practices conducive to visual control and lean production"

implementation: "the act of enacting; execution" (Morehead, 1995)

kaizen: "continuous improvement of an entire value stream or an individual process to create more value and less waste" (Marchwinski and Shook, 2004)

lean: "a business system for organizing and managing product development, operations, suppliers, and customer relations that requires less human effort, less space, less capital, less material, and less time to make products with fewer defects to precise customer desires, compared with traditional management" (Marchwinski, 2007)

method: "systematic procedure; a plan or system of conduct or action" (Morehead, 1995)

methodology: "a system of methods" (Morehead, 1995)

practitioner: "one engaged in a profession" (Morehead, 1995)

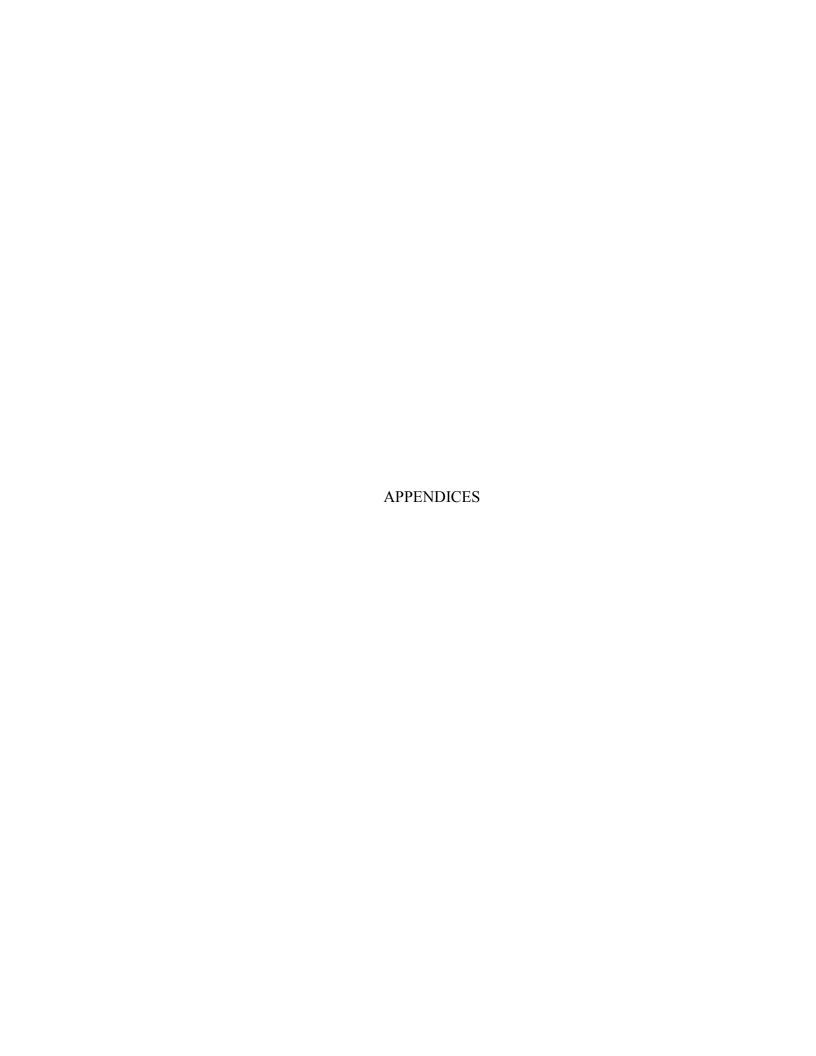
trainer: "one who trains others: (Morehead, 1995)



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Appendix A. Survey

Factors that impede and facilitate the implementation of lean methods

This survey is strictly confidential and your information will not be shared. Your Name: Date: Tell me about the organization you work for. Your response here: What is your job title? Your response here: What are your primary job responsibilities? Your response here: What do you know about lean enterprise? Your response here: Tell me about your experience in lean implementations. Is there any documentation you would be willing to share? Your response here: How many employees did you oversee in your largest lean implementation? Your response here:

Based on your lean implementation projects, how many people were involved in

leading/managing the project? What were their job titles and project roles?

Your response here:

There has been some debate as to the amount of time required to implement lean methods. What, in your opinion, is the optimum timeline for implementing lean methods? Your response here:

Was timing a critical factor in lean implementations? Please explain your response.

Your response here:

How did you know a lean implementation was successful?

Your response here:

How is success measured in a lean implementation?

Your response here:

What factors impede the implementation of lean methods?

Your response here:

What factors facilitate the implementation of lean methods?

Your response here:

If you were to begin a lean implementation in the future what would you do differently than in previous lean implementation projects you have been involved in?

Your response here:

What advice would you offer to persons preparing to implement lean methods?

Your response here:

What type(s) of formal training in lean enterprise have you received?

Your response here:

Which training topics are most effective in preparing the workforce for lean methods?

Your response here:

Which training topics are ineffective in preparing the workforce for lean methods? Your response here:

Has resistance been an impeding factor? If so, at what level in the organization? What factors create resistance at each level?

Your response here:

Are there any further recommendations you would like to offer with regard to implementing lean methods or preparing the workforce for a lean transformation? Your response here:

Appendix B. Category Coding

Category One: Respondent Industry

Industry	Manufacturing	Consulting
Number of participants	8	6

Category Two: Participant Job Title

_ category I !!	or i witigipui	10000 11010			
Job Title	Middle	Upper	Consultant	Continuous	Value Stream
	Manager	Manager		Improvement	Manager
				Leader	
Number of	5	2	5	1	1
responses					

Category Three: Participant Job Responsibilities

Job	Production	Quality	Training	Process	Lean		
Responsibilities	Planning	Management	Facilitator	Improvement	Implementation		
1					Facilitator		
Number of	2	2	11	1	1		
Responses							

Category Four: Participant Job Knowledge Level

Knowledge Level	Practitioner Trainer		Expert
Number of	1	4	9
Responses			

Category Five: Participant Experience Level

Category	Tive: I ditielpant Experience Eever							
Level of	Kaizen	Lean	Middle	Upper	Engineer	Consultant		
Experience	Team	Champion	Management	Management		or		
	Member					Instructor		
Number of	1	2	1	2	1	7		
Responses								

Category Six: Participant Scope of Responsibility

Scope of	1-250	251-500	501-750	751-1000	1000+
Responsibility					
Number of	7	1	0	2	4
Responses					

Comments: This category describes the participant's scope of responsibility with respect to the number of employees supervised in a lean implementation.

Category Seven: Number of Leaders in a Lean Transformation

Number of	0-5	6-50	51-100	101-200	200+
Leadership					
Personnel					
Number of	8	3	1	1	1
Responses					

Comments: This category describes the number of leadership personnel required to facilitate a lean implementation

Category Eight: Lean Implementation Leader Job Titles

Leader Job Title	Number of Responses
Engineering/Process Experts	4
Continuous Improvement/Kaizen	8
Leaders	
Line Worker/Hourly Associates	1
Maintenance Personnel	1
Supervisor/Foreman	4
Steering Committee Member	4
Lean Champion/Blackbelt	5
Value Stream Manager	6
Executive Staff Member	2

Category Nine: Lean Implementation Timeline

Time	Less	1 > 3	3 > 5	5 > 7	> 7 years	Undecided
Required	than 1	years	years	years		
	year					
Number of	1	1	4	1	2	5
responses						

Category Ten: Importance of Timing in a Lean Implementation

				_
Yes	No	N	o response	
9	2		3	

Category Eleven: Factors Successfully Driving a Lean Implementation

5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5						
Driving Event	Driven by	Driven by Management	New Product			
	Crisis	Deadline	Launch			
Number of	4	2	1			
Responses						

Category Twelve: Indicators of Success in a Lean Implementation

Response Categories	Number of Responses
Increased Profit	4
Cost of Operations	3
Improved Quality	2
Improved Delivery Times	1
Employee Satisfaction	3
Reduced Cycle Time	1
Inventory Reduction	3
Increased Productivity	3
Sales Growth	1
Employees Adopt New Philosophy	2
Reduction of waste	1
Improved Space Utilization	1

Category Thirteen: Measurables Indicating Success in a Lean Implementation

Response Categories	Number of Responses		
Improved Customer Satisfaction	1		
Increased Profit	5		
Improved Quality	3		
Improved Delivery Times	1		
Reduced Cost of Operations	5		
Reduction in Processing Steps	1		
Amount of Waste Reduction	2		
Reduces Cycle Time	3		
Inventory Reduction	2		

Category Fourteen: Impeding Factors in the Implementation of Lean Enterprise Methodology

Impeding Factors	Number of Responses		
Lack of Management Support	5		
Lack of Understanding	5		
Resistance to Change	4		
Lack of Employee Buy-In	3		
Lack of Reason to Change	3		
Lack of Employee Empowerment	3		
Poor Communication	3		
Organizational Culture	3		
Lack of Training	3		
Ineffective Leadership	2		
Traditional Thinking	2		
Bottom Line Thinking	1		
Poorly Planned Implementation	1		
Poor Reasoning in Management Deadlines	1		
Lack of Effort	1		

Category Fifteen: Facilitating Factors in the Implementation of Lean Enterprise Methodology

Facilitating Factors	Number of Responses		
Support Knowledgeable and Effective	7		
Leaders			
Driven by Crisis	4		
Dedicated Change Agent	4		
Employee Ownership and Empowerment	4		
Communication	2		
Understanding Theory and Application	1		
5S	1		
Teamwork	1		
PDCA	1		
Focus on Quality	1		
Visual Controls and Management	1		
Terminating Resistant Personnel	1		
Training in Change Management	1		
Strategic Congruence	1		
Supplier Involvement	1		
Customer Involvement	1		

Category Sixteen: Areas in Need of Improvement in the Implementation of Lean Enterprise Methodology

Response Categories	Number of Responses
Involve and Empower Employees	3
Incremental Implementation	1
Focus on Existing Problems	1
Banish Non-Supportive Managers	1
Cross-Departmental Involvement	1
Use PDCA Model	1
Establish Appropriate Measurables	1
Top-Down Approach	1
Establish Upper Management Buy-In	1
Establish Employee Buy-In	1
Less Theory More Application	1

Category Seventeen: Participant Suggestions

Response Categories	Number of Responses
Get Management Support	4
Bring in an Outside Expert	3
Begin with Value Stream Analysis	3
Begin with Management Training	2
Set Reasonable Goals	1
Communicate with Employees	1
Thorough Planning before Action	1
Publicize Success	1
Utilize In-House Consultants	1
Select Appropriate Teams	1
Utilize Systems Thinking	1

Category Eighteen: Participant Training Level

8 - 1 8					
Level of Formal	On the Job	Company-	College Courses		
Training	Training	Offered Training			
Number of	6	7	6		
Responses					

Category Nineteen: Effective Training Topics

Effective Training Topics	Number of Responses
Change Management	1
Kaizen/Continuous Improvement	3
Problem Solving	3
Kanban	2
Lean Principles	1
Value Stream Mapping	2
5S	4
Visual Controls	4
Standardized Work	3
One-Piece Flow	2
Pull Systems	2
SMED/Quick Changeover	2
Total Productive Maintenance	1
Statistical Methods	1
Types of Waste	2

Category Twenty: Ineffective Training Topics

Ineffective Training Topics	Number of Responses
Self-Directed Work Teams	1
Conventional American Systems	1
Statistical Methodology	1
Value Stream Mapping	1
5S	1

Category Twenty One: Levels of Resistance

Level in	Hourly	First Line	Middle	Upper	All Levels
which	Associates	Supervision	Management	Management	
resistance is					
present					
Number of	3	0	6	5	4
Responses					

Category Twenty Two: Causes of Resistance

Category 1 wenty 1 was caused of reconstance					
Cause of	Inappropriate	Lack of	Fear of	Misunderstanding	Fear of
Resistance	Measurables	Accountability	Change	of Lean	Job Loss
				Philosophy	
Number	1	1	7	8	6
of					
Responses					