ACHIEVING OPERATIONAL EXCELLENCE IN SERVICE SECTOR

USING LEAN SIX SIGMA

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ABSTRACT OF THE DISSERTATION

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Lean Six Sigma is a process improvement methodology that has been used in several industries and sectors for years. Even though Lean and Six Sigma come from distinct backgrounds, over a period of time, they have been used in conjunction with each other by companies to solve problems, increase efficiency and reduce waste in the processes. In the traditional schema of things, Lean Six Sigma methodology is more commonly used in a manufacturing setting. Further, the impact of organizational culture and leadership style is often ignored in the deployment of Lean Six Sigma methodologies.

The objective of this dissertation is to study the impact of organizational culture and leadership styles on the deployment of Lean Six Sigma and its outcomes in a service sector. In particular, this research focuses on Healthcare sector.
In Chapter 1, we provide an introduction to Lean and Six Sigma and provide an insight into the evolution of the methodology from Quality Management. We discuss one of the most common approaches, DMAIC, used in Lean Six Sigma to improve existing processes. We also introduce the various belts that individuals can earn in Lean Six Sigma.

Chapter 2 discusses the literature that was reviewed for this research and also introduces our hypothesis and propositions for the study.

Chapter 3 describes the methodology we sued to conduct the research. We studied the deployment of Lean Six Sigma in 3 different companies; a healthcare company, a medical devices company, and a pharmaceutical company. For study 1, we reviewed the procurement process at Company A. For study 2, we reviewed the Facilities work order process at Company B and for study 3, we reviewed the mail distribution process for Company C. Chapter 3 provides backgrounds of all 3 studies, one at a time, and also provides details of data collection and analysis conducted on all 3 studies.

In Chapter 4, we discuss the results from deploying Lean Six Sigma in 3 projects in 3 different companies. We also discuss the cultural implications and interaction effects of leadership and organizational culture on the results.

Chapter 5 summarizes the overall conclusions of the research and we discuss the findings and also discuss the strengths and limitations of our research and areas for future research.
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DEDICATION

Dedicated with love to papa.....

Er. Harjinder Singh Khurana (1940-2014)
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CHAPTER 1

INTRODUCTION

1.1 Purpose of Study

The purpose of this study is to examine the effect of leadership and organizational culture on the deployment of Lean and Six Sigma in Service Sector.

We try to answer the following questions in this research:

1. Does the culture of an organization play a role in achieving successful outcomes while deploying Lean Six Sigma?
2. Do leadership style and support from leadership play a role in achieving successful outcomes while deploying Lean Six Sigma?
3. Are organizational culture and leadership support central to the success of Lean Six Sigma deployment in an organization?
4. Does deployment of Lean Six Sigma impact the organizational culture and perhaps give rise to a new culture, over a period of time?
5. How to instill and sustain a successful Lean Six Sigma culture?

We will discuss successful implementation and critical factor and actions and strategies that drive the transition along with one failure and discuss what led to the failure.

We study the application of Lean and Six Sigma tools and methodologies in three different organizations. The author, a certified Master Black Belt from The American Society for Quality (ASQ) and considered a subject matter expert from a practitioner standpoint, managed the three studies and applied similar processes to three organizations
in the service sector, in particular, in the healthcare sector. We will not be disclosing the names of the organizations; however, the studies were conducted in: a healthcare company; a pharmaceutical company in its office environment; and a medical devices company (again in the service and transactional side of the business and not on the manufacturing side of the business).

Lean Six Sigma involves people at all levels and therefore culture must play an integral role in the success or lack thereof in its successful deployment in any organization as well as the successful outcome of any Lean Six Sigma project. (M.J. Pisani et al 2009). Yet, it has been observed in practice that many companies engage external Six Sigma Master Black Belts and consultants to deploy Lean Six Sigma and train their teams, however, the cultural element is often ignored and it is assumed that things will play out and people will adopt the new processes. Very little focus is laid to organizational culture or culture of the individuals belonging to those process improvement teams.

Some researchers agree that in order to be effective Lean Six Sigma initiatives should come from top and aligned with vision and mission of the organization and organizational strategies and become part of organizational culture (Daves and Walley, 2000; Corbett, 2007; Ben-Tovim et al, 2007; Hines et al. 2004: Hines et al. 2008). Researchers also agree to some extent that without the above, Lean Six Sigma will only deliver pockets of best practice and organizations will not reap the benefits that they could otherwise (Holweg and Pil, 2001; Radnor and Walley, 2008).
We chose service sector because the majority of the case studies written to date are from the manufacturing sector and individuals who are not versed with Lean Six Sigma methodologies conclude that it is applicable only to manufacturing industries. In particular, we chose healthcare within Service Sector.

Institute of Medicine released a report in the shape of a book in 2000, titled “To Err is Human: Building a Safer Health System”. This report focused on errors in healthcare and the subsequent results. According to this report, in 1997, “data collected when extrapolated to over 33.6 million admissions in the US hospitals, 44,000 – 98,000 Americans die each year as a result of medical results.” This report estimated that 58 percent of US medical errors may be preventable. As a nation, we are spending almost 18 percent of US gross domestic product on healthcare (Martin et al, 2011).

Even if use the lower of the two numbers mentioned in the report, in that particular year, it still made deaths due to preventable medical errors as the 8th leading cause of death. Since the publication of this report, several other reports have been published, but unfortunately, it seems like that still the number of errors in the hospitals is very high. It is no surprise then that Lean Six Sigma methodologies have found their place in hospitals and there are several practitioners that have tried to use Lean Six Sigma approaches to reduce the errors and increase the effectiveness and reaped benefits (Arthus, 2011: Buell, 2010; Furterer, 2011: Shah et al., 2008: Pocha 2010).
Hospital and Healthcare, in general, is the perfect setting to apply Lean Six Sigma methodology. There are hundreds of case studies that have been published around the globe and many more that may not have been published where practitioners have applied these. It will be very interesting to see the outcomes and how effective the efforts were.

This study will present findings related to how organizational culture impacts the outcome of deployment of Lean and Six Sigma tools.

**Originality/value** – This research will be one of the first to examine the impact of organizational culture on successful outcomes of efforts that go into Lean Six Sigma tools and also study the emergence of new culture from the deployment of Lean Six Sigma methodology.

**1.2 Background on Quality Management**

Oxford American Dictionary defines Quality as “a degree or level of excellence”. American Society for Quality (ASQ) explains Quality as “totality of features and characteristics that satisfy needs without deficiencies”

Generally speaking, Quality has two perspectives; Consumer’s and producer’s perspective. (Russell & Taylor) From a consumer standpoint, quality of a product or a service is measured by the ‘fitness of use’ for which the product or service is designed, in other words how well a product or service does what it is supposed to do.
At the same time, there is a concept of ‘Quality of Design’ which incorporates quality characteristics into a product or a service. For example, a watch is meant to indicate the time. Yet a ‘Rolex’ or ‘Omega’ sells for thousands while a regular watch could be had for a few dollars. Similarly, one can buy a handbag for a few dollars, yet designer handbags such as ‘Louis Vuitton’ and ‘Gucci’ can sell for thousands of dollars and consumers are willing to pay for it. From a fitness of use perspective, they are all fit for use. So are all the watches, regardless of brand and country of origin. Yet, it is the ‘quality of design’ that makes the distinction.

The producer of service provider views quality from a little bit different perspective. In the manufacturing sector, factors such as performance, reliability, conformance, durability, serviceability, and safety go in to play.

In the service sector, the factors are a bit different. They are timeliness, completeness, courtesy, consistency, convenience, and accuracy.

Overall producer’s perspective relies closely on what is termed as ‘Quality of conformance’ (Russell & Taylor). In theory, the consumer’s and producer’s perspectives must relate to each other. In reality, however, they often don’t.
1.3 Introduction to Lean and Six Sigma

Lean and Six Sigma are quality tools that trace their roots to last century. In the traditional schema of things, ‘Lean’ focuses on the reduction of waste i.e. non-value-added activities in any process; ‘Six Sigma’ focuses on reducing variation and errors in a process. Some organizations go to the extent of achieving the statistical goal of 3.4 defects per million opportunities (DPMO).

Background of Lean thinking goes back more than a century and can be traced back to 1880’s when, Frederick Taylor, who is also known as Father of Scientific Management, introduced mass production, assembly lines and division of labor to the world of manufacturing. However, it was not until Henry Ford and his Model T automobile, that Lean manufacturing became really known in the industry. Later in the century, Toyota also emerged as one of the pioneers in the application of Lean manufacturing in the Asian region.

Six Sigma, on the other hand, is a relatively new term and it became prevalent when many quality programs, such as TQM, QFD, were proliferating in the manufacturing sector in 1980’s. While Motorola is given most credit for success of Six Sigma, there are many other companies that deployed Six Sigma to achieve operational excellence and business success, such as General Electric, Honeywell, Sony, Caterpillar and most of these companies claim to have achieved huge return on investments from deployment of Six Sigma program (Zu, Robbins & Fredendall, 2010).
While traditionally these two methodologies have been used independently, in the last decade or so practitioners have started using these methodologies together, and a new term, ‘Lean Six Sigma’, has been coined. When used together, practitioners claim that Lean Six Sigma becomes a very powerful methodology to achieve operational excellence, especially in today’s age when consumers and clients demand and expect near-perfect quality at a very reasonable cost. It encompasses a mindset and a philosophy and uses various management and planning tools to help the businesses in improving their processes, bottom line, and customer service. Lean Six Sigma is about maximizing efficiency through change and by incorporating the needs, wants and feedback from the stakeholders and process owners.

Every process has some form of waste, also known as ‘muda’ (a Japanese term, but commonly used in Lean Six Sigma). One of the most prominent features of Lean mindset is the thought process around different kinds of waste. In the traditional schema of things, there are 7 forms of waste:

1. Transportation
2. Inventory
3. Motion
4. Waiting
5. Overproduction
6. Overprocessing
7. Defects
In modern days, some Lean Six Sigma practitioners count “money” as the 8th form of waste.

A process can be defined as a sequence of tasks or activities that contains some inputs and provide the desired output. Customers (internal or external) are only interested in activities that are value-add from their perspective. However, in any process, there are value-added, as well as non-value-added activities. Figure 1.1 below demonstrate the 3 kinds of activities in any process.

![Activities in a process](image)

**Figure 1.1**: Activities in a process

Value-added activities are those activities which the customers are willing to pay for. As discussed earlier in the section on quality of design, one may argue that he or she sees value in an expensive watch while for another individual it may be nothing more than a commodity item. The same concept applies to some extent in the process activities.

From a healthcare standpoint, let’s study an example to illustrate the activities in a process and explain all three activities shown in figure 1.1
Let’s assume a patient goes to see his or her primary care physician. The patient is welcome by the receptionist at the front desk where the health insurance and person’s identity is verified. Then the patient is asked to sit in the waiting area. After some time, the patient is sent to another area where a registered nurse takes the patient’s vital signs. Following that, there is an additional waiting period. Eventually, the patient is seen by a doctor.

Now all of the above is really nothing more than a process from a Lean Six Sigma standpoint. It is a process in which a patient is being seen by the primary care physician. Some of the activities in this process are value added to the patient, from his/her perspective. For example, the time that is spent with the doctor. Perhaps also the time spent with the nurse when the vital signs are being taken.

For the most part, everything else is non-value-added from customer’s standpoint. However, some of the activities are required, even if non-value-added from customer’s standpoint. The verification of health insurance, for example, is a required non-value-added or business value-added activity. Some of the other activities, such as the time spent in the waiting room initially before being seen by the nurse and afterward while waiting for the doctor are completely non-value-added activities.

Lean practitioners try to study the processes across various industries and identify the activities that are value-added vs. the ones, that are not. The mission is to eliminate ‘Muda’ or non-value-added activities and reduce the business value-added activities to the extent possible so that the overall value of the process can be enhanced.
1.4 Introduction to DMAIC methodology

DMAIC is one of the most commonly used approaches in Six Sigma methodology. It is also known as the cycle of continuous improvement. DMAIC stands for Define, Measure, Analyze, Improve, Control. DMAIC is the lifeline of any Six Sigma process. There are other methodologies one can use. DMADV is one of them, which stands for Define, Measure, Analyze, Design and Verify. But DMAIC is the most commonly used system used worldwide.

The figure below demonstrates high-level activities in DMAIC methodology.

![Figure 1.2 Summary of high-level activities in DMAIC methodology](image)

‘Define’ phase is the backbone of the Six Sigma methodology. It can be considered as the foundation of the building. In the case of deployment of Six Sigma, ‘Define’ phase is the foundation of process improvement initiatives that an organization or process improvement team is going to take throughout the DMAIC methodology.
In the ‘Define’ phase, the Six Sigma team identifies who the customers are, both internal and external. The team also determines the goal and agree on what they are trying to problem solve or improve in the process. This is the phase where the team establishes the goals, the objectives and the ground rules, expectations and develops a project charter. The ‘Define’ phase undoubtedly the most significant phase. If the team does not contribute the appropriate efforts into ‘Define’ phase that it should, more likely than not, the Six Sigma team is going to come back from ‘Analyze’ or ‘Measure’ or ‘Improve’ phase back to the ‘Define’ phase.

Some of the key activities included in the ‘Define’ phase are:

- Defining the process improvement goals that are consistent with customer demands and company strategy.
- Defining who the customers are, what their requirements and expectations are for products and services.
- Defining the project boundaries and where the process begins and ends.
- Defining the process that is to be improved by mapping the process flow.

The ‘Measure’ phase includes all the activities in which the Six Sigma team measures the current performance and establishes a baseline for the process. It is extremely important to measure the current performance and define baseline measurements on current process for future comparison. To do so, the team needs to collect various data from primary and secondary sources and establish the key performance indicators (KPI’s) and metrics. It is in this phase that the team develops a data collection plan and also conduct ‘As-Is Process Mapping’ workshop, which we will explain in detail in Chapter 3.
Next phase is ‘Analyze’. In this phase the Six Sigma team identifies gaps between current performance and goal performance and identifies the sources of variation. This is when root cause analysis is conducted to determine the root causes of the defects or variation. The relationship and causality of factors are also verified in this phase.

The phase following ‘Analyze’ is ‘Improve’. This is when the Six Sigma team actually implement some of the solutions. Solution Planning is done and “To Be” charts are created. The implementation plan is developed and employed. Failure Mode Effects Analysis is conducted.

The final phase of DMAIC methodology is the ‘Control’ phase, where the Six Sigma team develops and deploys the control plan and figure out how are things actually working against how they thought it would work, so they can control the actual performance process. ‘Control’ phase is a very critical phase of DMAIC methodology, yet in practice, very few organizations actually use implement this phase.
1.5 Lean Six Sigma Belts

Lean Six Sigma management follows the naming convention that is used in martial arts. While there is no universal standard, the most commonly used belts and their hierarchy level is shown in the figure below:

![Figure 1.3: Six Sigma Management: Hierarchy of Belts](image)

**Master Black Belt**

ASQ defines Master Black Belt as someone who is:

“Six Sigma or quality expert responsible for strategic implementations in an organization. An MBB is qualified to teach other Six Sigma facilitators the methods, tools, and applications in all functions and levels of the company and is a resource for using statistical process control in processes.”
Master Black Belt is considered a subject matter expert on Lean Six Sigma tools and methodology; and acts as a change agent in an organization. 100% of efforts of a Master Black Belt gear towards process improvement. At any given time, in any organization, a Master Black Belt oversees 15-25 projects simultaneously.

A major responsibility of a Master Black Belt is to train other belts and coach Black Belts. Master Black belts also lead the project reviews and understand the advanced statistical theory. It is a great distinction to achieve the status of a Master Black Belt in any organization and is considered the backbone of the Six Sigma culture. While many organizations have their own certifications and the criteria to achieve certifications is somewhat unclear, American Society for Quality (ASQ) is considered a gold standard, when it comes to Quality Certifications. Master Black Belt certification from ASQ is one of the most coveted and difficult to obtain. Since the launch of MBB certification in 2011, only 107 individuals across the globe have achieved the distinction of ASQ MBB until May 2018.

**Black Belt**

ASQ defines a Six Sigma Black Belt as someone who is:

“Full-time team leader responsible for implementing process improvement projects within a business to drive up customer satisfaction and productivity levels.”

A Black Belt in Lean Six Sigma is considered the team leader of the project and responsible for carrying out the actual digging and get hands dirty. 100% dedication is to fixing issues and improving processes.
Green Belt

ASQ defines a Six Sigma Green Belt as:

“An employee who has been trained in the Six Sigma improvement method and will lead a process improvement or quality improvement team as part of his or her full-time job.”

A Green Belt leads at least one Lean Six Sigma project demonstrating depth and breadth of Lean Six Sigma tools and methodology and understanding of team dynamics. A Green Belt knows basic analytical tools and delivers focused projects using the Six Sigma methodology and tools. Green Belts assists Black Belts in their functional area, however, they work on projects part-time, as they have other jobs as well in their functional areas.

Yellow Belt

ASQ defines a Six Sigma Yellow Belt as:

“An employee who has been trained in the basic to moderate Six Sigma improvement methodology and is able to participate in process improvement or quality improvement team.”

A Yellow Belt is someone who understands basic analytical tools and concepts of Six Sigma and can support Green Belts in managing a Six Sigma project. Yellow Belts may assist Green Belts in their functional area on projects. They participate as an active member of the Lean Six Sigma project and demonstrates the understanding of basic tools and concepts of Lean Six Sigma by assisting the Green Belt. Like Green Belts, they also have jobs outside Six Sigma organization in their functional areas.
White Belt

While a White Belt is not formally a certification, it is something that has been offered in the very recent past by the organizations. A White Belt training is being offered by best-in-class organizations, company-wide to all of its employee through a 4-6 hours training session. A white belt has basic introductory knowledge of Lean Six Sigma and can understand the lingo and terminology used in Lean Six Sigma projects.
CHAPTER 2

LITERATURE REVIEW

2.1 Literature Review

A thorough literature review of all the articles published in peer-reviewed journals in the last 20 years from 2018 was conducted. We used ‘Lean’ and ‘Six Sigma’ as key terms. The review revealed that there has been some research done on Six Sigma as a stand-alone methodology and extensive research on Lean manufacturing, again as an individual methodology that focused only on manufacturing sector (Zu et al (2010), Hendry & Nonthaleerak (2005)). However, there is not enough research on the effect of combining Lean Six Sigma. Furthermore, there is very limited research done on the impact or interference of Culture on either Lean or Six Sigma or both. In a 2009 article, titled “Is Six Sigma culture bound” by Pisani et al, the authors have constructed a model utilizing Hofstede’s cultural dimensions as a moderator on each of the more commonly known five phases of Six Sigma: Define, Measure, Analyze, Improve and Control. The authors propose that each of the five stages is moderated by national culture. However, they conclude that further research is required.

![Figure 2.1 National culture and Six Sigma: a conceptual model M.J.Pisani et al (2009)](image-url)
A couple of other authors have come up with critical factors for successful implementation of six sigma projects (Coronado & Antony (2002) and Gijo, E.V. & Rao, T.S. (2005)). However, no one touches cultural elements.

As far as the deployment of Lean Six Sigma in healthcare is concerned, there is extremely limited research done on the academic side. Most recently in the last 5 years, a few researchers from the University of Illinois have done some research on the impact of Lean and Six Sigma for enhanced outcomes on US hospitals. However, there is no inclusion of culture and its impact on the outcomes.

American Society for Quality (ASQ) has created a Healthcare division, which has published 28 case studies that explore deployment of Lean Six Sigma tools and methodologies in hospitals in last 5 years. There are several other case studies discussing best practices in hospitals across the globe and further, there are several case studies done on hospital settings in different departments and processes to evaluate the effectiveness of Lean or Six Sigma.

Recently, Gowen III et al (2012) examined how process improvement initiatives enhance hospital outcomes, such as hospital error sources, effectiveness results etc. They claim their study to be the first study ever, that examines the impact of process improvement initiatives on error sources. However, there is not any case study or substantive research data that examines the impact of culture either as a moderator or a mediator.
2.2 Contrasting Academic publications on Lean Six Sigma against industry practices

On the academic side, it seems like there has been a lot of studies done on Total Quality Management (TQM), but Six Sigma is still considered a relatively new field and some of the researchers on the academic side still seem to have difficulty with accepting that Six Sigma brings any value to the table, rather they see it as a repackaging of TQM (Stamatis (2000), Gabor (2001), Senapati (2004)).

There seems to be a wide gap between the industry and researchers when it comes to Lean Six Sigma. On the industry side, there are countless consultants who claim to be subject matter experts on the topic and offer training and certifications on Lean Six Sigma to their clients, however the most credible source is American Society for Quality (ASQ), a professional organization for Quality professionals that spans across 140 nations and has thousands of members. It offers several certifications including Six Sigma Green Belt, Six Sigma Black Belt, Six Sigma Master Black Belt and newly started Six Sigma Yellow Belt for starters.

For all practical purposes, ASQ is considered an authority across the world for Quality. It has several thousand volunteers across the world and its own publishing press and several quality divisions and affiliates that conduct research and publish them on a periodic basis. However, the level of research and publications is not near the typical academic research.
There are several other papers written by practitioners in form of case studies ranging from healthcare to IT to hospitals. Similarly, there are hundreds of books published on these topics by practitioners, however, there is no academic research involved and therefore no research framework.

2.3 Hypothesis & Proposition

The first hypothesis that this study is going to check is as follows:

H1: Lean Six Sigma deployment mediates Leadership style of the senior management and that in turn mediates the outcome of the projects and Lean Six Sigma deployment.

*Figure 2.2 Mediating effect of Leadership on the deployment of Lean Six Sigma and its outcomes*
Our second hypothesis is:

H2: Organizational Culture moderates the relationship between successful outcomes and deployment of Lean Six Sigma in an organization.

Figure 2.3 Moderating effect of organizational culture on the deployment of Lean Six Sigma and its outcomes

We are also proposing that:

- Lean Six Sigma deployment gives rise to a new Organizational Culture and effectively a new Leadership style: Lean Six Sigma Leadership
CHAPTER 3

METHODOLOGY

3.1 Background on the project for Study 1

For Study 1, we reviewed the Procurement process in Company A.

3.1.1 Procurement Process in general

Procurement process starts when a need arises or an idea is conceptualized. In most of the companies, including the one we studied, the stakeholders submit a requisition. A requisition can be a paper document, however in the modern times and in most of the advanced companies, an ERP system is used, where the requisition is an electronic document that goes through a workflow approval process. It is generally submitted by the end user or someone designated in the department of the end user, who is usually designated as a ‘requisitioner’. Upon a few approval steps, the requisition eventually is received in the Procurement department.

Procurement department then reviews the need or demand for a product or service by the requisitioner (department or individual) and either try to source or procure the material or services. While the process may sound pretty straightforward, the process can become quite complicated depending on various factors such as a one-time purchase or not, need to conduct one or all of the below: Request for Information (RFI), Request for Proposal (RFP), Request for Quote (RFQ). There are several other sourcing methodologies, such
as an e-auction or reverse auctions as well as ‘3-bids and buy’, where the focus is given only to cost. ‘3-bids and buy’ is particularly common in public sector where the public agencies and organizations are often bound by the law to conduct an RFP process and solicit bids from at least 3 vendors or suppliers.

The whole procurement process can be further complicated when in addition to commercial terms, legal negotiations are required. Some companies have reported spending more than a couple of years on legal negotiations on a Master Services Agreement (MSA), which is an overarching agreement between two organizations and focusses on broader terms between two organizations. Often Purchase Order(s) or specific contracts are carved out of a Master Services Agreement.

3.1.2 Procurement or Purchasing Process in Company A

The Procurement or Purchasing process, (as it was known in Company A) in Company A is very similar to the general process explained above. Company A used ‘Oracle’, a very famous ERP for most of the transactions related to the company, including purchasing.

The perception of senior leadership team was that the purchasing process was time-consuming and many stakeholder groups were not willing to involve the Purchasing department because it was not perceived as a value-added organization. It was perceived by the other business units, that once involved, Purchasing department would usually unreasonably delay the sourcing of goods and services and add unnecessary layers of complexity to the process.
It was decided that there was an opportunity to improve the Purchasing process and the organization decided to use Lean Six Sigma methodology to do so. Within Lean and Six Sigma, DMAIC methodology was chosen to evaluate the Purchasing process. DMAIC methodology is best used for an existing process when there is an opportunity to improve the process.

The leadership team of the company was particularly agreeable to dedicate the resources to deploy Lean Six Sigma.

A governance structure was put in place, as depicted below.

![Governance Structure in Company A to deploy Lean Six Sigma](image.png)

*Figure 3.1 Governance Structure in Company A to deploy Lean Six Sigma*

The Operational Excellence leader was identified as Sr. Vice President of Shared Services in Company A. Responsibilities of the Operational Excellence leader included setting performance targets and approving funding for the project. The leader was also
expected to remove any barriers to successful implementation of the project. Further, it was also expected from the Operational Excellence leader to supervise the program at a very high level.

A Steering Committee was established that consisted of three Vice Presidents of various organizations in Shared Services business unit. It included the Vice President of Supply Chain (that included purchasing activities), Vice President of Facilities; and Vice President of Operations. The members of the Steering Committee were hand-picked by the Operational Excellence leader. Their responsibilities included providing guidance to champions and project team, review and approve the progress at toll gate check-ins and provide direction to the team.

Champions included two Directors; Director of Purchasing and Director of Operations for the organization. The champions were accountable for meeting the targets set by the Steering Committee. They reviewed the progress on a day-to-day basis.

Company A also established a process council and a customer council. Process council was a team of all the key process owners within the Purchasing department. Since it was a huge Purchasing team, it was decided to establish a process council to keep them informed and engage them on a periodic basis. Similarly, a customer council was formed consisting of a group of key internal customers of the Purchasing department. Data analysis was done for last 5 years to identify these key customers.
3.1.3 Six Sigma training at Company A

It was decided to use a thorough vetting process to select candidates for the first cohort of Lean Six Sigma Yellow Belt Training.

Company A received 31 applications for the 1st cohort. The selection of candidates was done through a 3-level review process. In the 1st level of review, the project managers ensured that the candidates who applied for yellow belt training met the basic requirements, that included:

- Tenure of a candidate with company: It was decided that the candidate must have been employed and working with Company A for at least two years. It was concluded that with a tenure of at least two years, the candidates would be familiar with the several processes related to Purchasing.

- Annual Rating of Employee: It was determined that the candidate applying for the program should at least have a “meets” rating, which was right in the middle of the rating scale used by Company A. The rating metrics were: “Does Not Meet”; “Meets” and “Exceeds”

- A copy of CV or resume

- A brief statement (500 words or less) of interest justifying why the candidate should have been chosen for the yellow belt program.

- A statement of recommendation along with approval to devote 20% of the candidates’ time (one day a week) on Lean Six Sigma deployment for 6 months, post the training, by the direct supervisor of the candidate.
After Level 1 review, 22 out of 31 candidates were selected for Level 2 Review. Level 2 review was conducted by the Champions of the Operational Excellence along with Master Black Belt engaged to provide training and coaching to the Company A.

In Level 2 review, the reviewers rated the candidates on the following criteria:

- Analytical mindset
- Passion for process improvement
- Manager’s nomination
- Quality of process improvement idea
- Communication skills
- Ability to work in teams

Finally, 18 candidates were passed on to Level 3 Review, that was conducted by the Steering Committee. In Level 3 review, the Steering Committee members met the candidates in a 1:1 interview that lasted between 10 and 15 minutes. The focus of the review was the process improvement idea and alignment with the culture of the organization for the long-term success of the individual at the organization, post the training. All bar one candidates were finally selected for the first cohort of Lean Six Sigma Yellow Belt Training in Company A.

The time, resources and efforts that Company A spent in recruiting the candidates for getting trained on Lean Six Sigma methodologies in itself established a best practice for Lean Six Sigma and established a strong leadership support in the deployment stage of Lean Six Sigma.
These 17 candidates were trained on Lean Six Sigma methodology at Yellow Belt level for 4 days. During the training, the candidates were divided into teams of 4-6 members each and a hands-on approach was used, where the candidates were made to work on real-life examples, rather than just providing theoretical basis of the tools.

After the training concluded, 3 teams were formed out of the 17 candidates. It was decided to use DMAIC methodology for the Purchasing process. The Purchasing team was scheduled to meet once a week on a weekly basis. It was decided that if a candidate missed more than 3 days of the Lean Six Sigma initiative, without a valid and reasonable reason, they would be debarred from the Operational Excellence program and would not be eligible to receive the Yellow Belt certification. The senior management supported this decision fully and it was communicated to the candidates by the champions.

From an organizational culture standpoint and leadership support perspective, this meant that at Company A, Lean Six Sigma team had full support from the leadership and senior management and organizational culture was very conducive of the changes.
3.1.4 Project Charter for Purchasing Process at Company A

While the Purchasing team started working on the project charter in the training itself, it took 2 weekly meetings to develop an in-depth project charter.

The problem statement was drafted as:

“Evaluate and improve the requisition to-check process with an aim to reduce cost, cycle time, variation and become a trusted strategic partner”

The key goals and objectives of the project were to:

- Conduct value stream analysis and optimize the requisition-to-check process
- Improve satisfaction
- Establish a baseline and reduce current process transactional costs
- Engage stakeholders and enhance the value proposition of team

The key deliverables expected from project team were:

- Streamlined and Standardized requisition to-check process
- Increase in customer satisfaction by 15%
- Identify and reduce transactional costs by 20%
- Reduce contract processing time by 15%
- Positive impact on professionally managed spend
- Updated Operating Procedures
The team decided that the following would be in the scope of the project:

- All steps in the process from requisition approval to payment of services or goods

Further, it was decided that the following would not be in the scope of the project team:

- Quoting process with vendors, pre-requisition work, requisition receiving process, inspection/quality assurance, vendor invoice process, Tax, Oracle Support team.

The process start point was determined to be the generation of requisition and process end point was determined to be the activity when the vendor is paid either electronically or through a physical check, after conducting a 3-way match.

The team made the following assumptions and they were reviewed and approved by the steering committee:

- Current staffing levels won’t increase
- Employee safety will continue to be a top priority
- Current technology will be used in the future process

Following risks and constraints were identified:

- ERP upgrade won’t allow any changes for next 12 months
3.2 Study 1: Data Collection & Analysis

3.2.1 Study 1: Voice of Customer interviews

The team conducted 71 face-to-face interviews, commonly known as ‘Voice of Customer’ interviews. The team first classified key departments that submitted the higher volume of requisitions on an average, in the last three years. Then key requisitioners from each department were then identified. Requests were sent out to set up the meetings. An overarching request was sent out by the Steering Committee. The interviewers used a survey instrument that comprised a few open-ended questions and 9 questions to rate the satisfaction of Purchasing department and Purchasing/requisition to-check process. The 9 rating questions used a Likert scale of 1 to 5. The requisitioners ranked the process and team on criteria, such as timeliness, efficiency, communication, helpfulness, knowledge, the expertise of the team, value-add of Purchasing team, quality of service and overall satisfaction with the requisition to-check process. After calculating the average of averages, customer satisfaction index was calculated at 3.28 on a scale of 1 to 5.

*Figure 3.2 Results of index questions of survey for Purchasing process at company A*
The scale used was:

1- Strongly dissatisfied
2- Dissatisfied
3- Neutral
4- Satisfied
5- Strongly Satisfied

Anything below a satisfactory score (or 4) is generally speaking not acceptable.

Unfortunately, for the Purchasing department at Company A, none of the 9 rating questions made it to the average score of 4. This explained that there was a lot of opportunity for improvement.

The key themes that emerged out of the open-ended responses were:

- Lack of communication between Purchasing and customers.
- Purchasing department was not perceived as a value-added organization business partner.
- The respondents were of the opinion that personnel in Purchasing department were mostly transactional (Purchase Order) PO or paper pushers.
- The respondents were generally not aware of the timeline for Purchasing process and were not engaged in the process.
- Majority of the purchases were planned and most of the business units had budget meetings yearly in the year to plan out their yearly activities.
• Most of the customers were familiar with vendors in their areas. However, they were not aware of the key Purchasing personnel in their respective categories.

The questionnaire for Purchasing process at Company A is included as Appendix-1.

In addition to the VOC interviews, 10 ‘Gemba Walks’ were conducted. ‘Gemba’ is a Japanese term that means ‘actual place’. ‘Gemba Walk’ is a term used in Lean Six Sigma when Lean Six Sigma team observes the process at the actual place of the process and asks clarifying questions about the process. The team is usually instructed by the Master Black Belt to not interfere with, or question the process followed by the process owner. Further, it is also emphasized to reduce the ‘Hawthorne’ effect and to do so, generally, a communication is sent to the process owner and their team explaining the need of ‘Gemba Walk’ and emphasizing the focus on process improvement and observation from that perspective only. Pain points were identified in these ‘Gemba Walks’ and improvement opportunities were validated.

The team used SIPOC, which is another commonly used tool in Lean Six Sigma methodology. It is a means used by Six Sigma process improvement teams to identify all relevant elements of a process improvement project before work begins. SIPOC diagram is used to gather a snapshot view of the process. It is generally used at the start of a project to provide information to the project team before work commences. SIPOC for Purchasing process is included as Appendix-2.
3.2.2 Study 1: ‘As-Is Process Mapping’

Most importantly, the process improvement/Lean Six Sigma team conducted ‘As-Is’ or current state Process Mapping. This is one of the most crucial elements of ‘Measure’ Phase. In the conventional sense, a process map is nothing more than a flowchart, which is used in various sectors and industries to depict the sequence of steps in a process. However, in the domain of Lean Six Sigma, a process map provides crucial information on the current state.

The process explained can be a manufacturing process, transactional or administrative process in any sector. (The Quality Toolbox 2nd edition by Nancy Tague).

Ikea, the Swedish home furnishing company, for example, is known for including a process map or flow chart in all their furniture boxes where a fictitious assembly guy walks the customers through the process of assembling the furniture at their home or workplace.

Practitioners define a process map or a flowchart as a pictorial of separate steps of a process in a sequential order.

In the Lean Six Sigma world, an ‘As-Is Process Map’ is one of the most critical milestones that the team must cover before moving to the next phase. ‘As-Is’ or the current state of the process provides the information on how the process works currently.
A good Six Sigma practitioner knows how to extract the information navigating his/her way through negative team dynamics and insecurities and hidden agendas of stakeholders. Often the information provided by stakeholders in separate sessions is contradictory and it’s best to have a full day long ‘As-Is Process Mapping’ workshop, where the key stakeholders and process owners can be invited and an open discussion held. Often, the stakeholders exchange in the workshop itself, how some of them have been doing repetitive work. Further, it is not uncommon and quite normal to observe that stakeholders jump to root causes or even solutions to those causes. Once again, it is the responsibility of a good Lean Six Sigma professional to moderate the conversation and ensure that the team members attending and participating in the ‘As-Is Process Mapping’ workshop focus only and only on the current state of the process and not on the future state, or the ideal process, or even the process as documented in operating procedures.

Lean Six Sigma has a process of its own and it only works if the process is followed.

It is certainly not an easy task to play the role of the moderator, as there is a fine line between a moderator and a process owner and Lean Six Sigma professionals are certainly not the process owners. Therefore, they should be collecting as much of information, as possible, in the workshop and not make assumptions. Unfortunately, many organizations consider existing policies and procedures and Standard Operating Procedures (SOP’s) as the correct version of how the current process works. That is the version of how the process should work. However, over a period of time, the process owners and stakeholders figure out their own ways and shortcuts to do things and change the inputs and activities within the process to deliver similar output. Therefore, it is not uncommon
at all to see fundamental variations from the process as described in the standard operating procedure or other policy documents.

In any case, leadership support is of utmost importance in running a successful ‘As-Is Process Mapping’ workshop. For Lean Six Sigma practitioners, ‘As-Is Process Mapping’ is not just recording the flow of a process. Rather it is Value Stream Mapping.

To revisit from Chapter 1, from a Lean Six Sigma perspective, the customer (internal or external) defines which activity is value added and which is not. Customers are only willing to pay for value-added activities. (Figure 1.1)

In Company A, over 30 stakeholders from various business units were invited to participate in the ‘As-Is Process Mapping’ workshop. The attendees were given a brief overview of the purpose of the ‘As-Is Process Mapping’ workshop in advance and also given a very brief tutorial on the day of workshop by the author. The team used colored ‘post-it’ notes to record the current steps in the process. The green color was used for value-added steps, yellow for business-value-added, red for non-value-added and blue for external processes.

At a later day, these steps were logged electronically using ‘Microsoft Visio’, one of the commercially available software’s. Once recorded, the draft process map was sent to all the attendees for verifications. 6 stakeholders sent their corrections, which were then edited by the core team. The final draft was shared again with the attendees and process owners to get their approval. Once the final approval was received, the ‘As-Is Process
Map’ was analyzed and shared with the Steering Committee. The ‘As-Is Process Map’ for Purchasing process for Company A is included as Appendix-3.

One of the significant data collected from process map was the proportion of value-added vs. non-value-added steps. Table 3.1 summarizes the steps in the Purchasing process at Company A.

**Table 3.1 Summary of ‘As-Is Process Map’ steps for Purchasing Process at Company A**

<table>
<thead>
<tr>
<th>Step Description</th>
<th>Count</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchasing requisition to-Check Process</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business Value-Add Steps</td>
<td>136</td>
<td>41%</td>
</tr>
<tr>
<td>Business Value-Add Decision Points</td>
<td>68</td>
<td>20%</td>
</tr>
<tr>
<td>Customer Value-Add Steps</td>
<td>8</td>
<td>2%</td>
</tr>
<tr>
<td>Non-Value Add</td>
<td>99</td>
<td>30%</td>
</tr>
<tr>
<td>Links to External Process</td>
<td>24</td>
<td>7%</td>
</tr>
<tr>
<td>Total Steps</td>
<td>335</td>
<td>100%</td>
</tr>
</tbody>
</table>

This was an eye-opening experience for the steering committee and leadership team in Purchasing department. As seen in Table 3.1, only 2% of the overall steps in the process were seen as value added from the perspective of internal customers of the Purchasing department. While more than 40% of the steps were business value added or required steps, there were about 30% steps which were a complete waste or ‘Muda’.
From a cultural standpoint, it was an interesting observation that throughout the phase of collecting voice of the customer through conducting interviews and conducting ‘Gemba Walks’ and collecting other data, for the most part, there was no resistance organization-wide and most of the stakeholders were open to meetings and providing the information that was needed. It made it somewhat easier for the team to collect data and conduct analysis and it was evident that organizational culture was playing the role of a moderator.

3.3 Study 1: Root Cause Analysis

Following the data collection and measurement, the team conducted a root cause analysis workshop to brainstorm and identify the root causes behind the inefficiencies in the Purchasing/requisition to-check process.

Lean Six Sigma practitioners use ‘Ishikawa / Fishbone’ diagram to conduct the root cause analysis. The concept of Fishbone diagram was developed by Kauro Ishikawa in 1940’s in Japan, hence it is also known as Ishikawa diagram. Ishikawa diagram is a rational and logical approach to identify many possible root causes for an effect or a problem or a variation. Ishikawa diagram can be used to analyze positive as well as negative effects.

Of course, there is an alternative to root cause analysis: the gut reaction. While gut reaction may work at times, just out of pure chance, it doesn’t work all the time. Root cause analysis is used not just to problem solve in Lean Six Sigma but in various other fields, such as medical and automobile.
While there are several approaches to conduct root cause analysis, 5 Why’s analysis and Fishbone Diagram are the two most commonly used approaches in Lean Six Sigma.

Root cause analysis workshop is the second major milestone in a Lean Six Sigma project. However, unlike ‘As-Is Process Mapping’ workshop, in this workshop, more responsibilities fall on the core Lean Six Sigma team as they are responsible for root cause analysis and problem-solving. Stakeholder management and buy-in, however, is an extremely critical piece in the ‘Analyze’ phase of DMAIC methodology, in which root cause analysis is conducted.

While there is no right or wrong way to draw the fishbone diagram, the best way to start is by focusing on the effect or key problem and working backward and brainstorming the major causes of that problem. Practitioners generally use 6 headings or categories, commonly called the 6 M’s.

The 6M’s are:

- Man (personnel)
- Machine
- Methods
- Materials
- Measurement
- Mother Nature (environment)
A typical Ishikawa diagram is illustrated below:

![Ishikawa Diagram](image)

*Figure 3.3: Typical Fishbone / Ishikawa Diagram*

In Company A, a detailed root cause analysis (Figure 3.4) was conducted for the requisition to-check process. Instead of the generic 6M’s, 6 different categories that related more closely to the environment of the organization and situation, were chosen. The results were summarized in an overview fishbone diagram (Figure 3.5) and it was shared with key stakeholders and process owners as well as the Steering Committee. Both the detailed and overview of root cause analysis are depicted on the following two pages.
Figure 3.4: Detailed root cause analysis for inefficiencies in Purchasing process at Company A
Figure 3.5: Overview of root cause analysis for inefficiencies in Purchasing process at Company A
The five key categories that were identified as key root causes were:

1. Oracle, the ERP system
2. Requisition Assignment
3. Organizational Culture
4. Legal department
5. Risk Management

It may be recalled from Chapter 2 when the team developed the project charter for the project, it had identified upgrade of Oracle as a risk, as the team was informed that due to the upgrade, the company had informed that no changes would be allowed for next 12 months. As a result, the team recognized that most of these root causes, related to the ERP system, may not be removed, yet the team decided to document them and bring it to the attention of management, so at the right time and opportunity, the management would be aware and the solutions related to these root causes could be appropriately prioritized.

The second category, ‘Requisition Assignment’ had all the root cause related to the point, where a requisition was received by Purchasing team and then assigned to Purchasing Agents within the Purchasing team. Key issues identified here were:

- Incorrect assignment of the requisition by the Purchasing group
  - The root causes of this issue were identified as non-optimal resource planning and lack of knowledge and experience.
• Assignment of requisitions was not being done in a timely fashion, causing excessive delays.
  o The root cause to this was identified as non-utilization of functionality in ERP system for requisition assignment
• The non-standardized process to assign requisitions
  o The root cause to this was identified as lack of training and lack of standardization in the formatting of the Purchase Order.

Key root causes in Organizational Culture category were:

• Lack of Category Management
  o The root cause to this was identified as lack of planning, training and leadership support on category strategy planning
• Lack of collaboration
  o The root causes to this were identified as a culture of the organization for its business units and employees to operate in silos

The key root causes in Risk Management were:

• Lack of vendor risk management
  o The root cause to this was identified as lack of standardization in Purchasing processes, lack of training to Purchasing Agents and inconsistencies in how vendors were approached.
The key root causes in the legal category were:

- Lack of prioritization. The root causes to this were identified as:
  - lack of collaboration between Purchasing and legal teams
  - lack of training
  - unclear roles and responsibilities between law and Purchasing

While the three categories, Legal, Risk Management and Organizational Culture, were called out separately when analyzed closely and from a management standpoint, these are all part of the organizational cultural issues.

The team was not made aware of the hypothesis that we were trying to validate through this case study. However, it was a very interesting observation to note that majority of the key underlying root causes behind the inefficient Purchasing process were related in one way or other to organizational culture. When the root cause analysis was presented to the steering committee and leadership, they acknowledged the issues and prioritized the objectives according to what they could control and what they could not.

The core team conducted benchmarking and decided to use the cost of issuing a Purchase Order as a key metric of success of the project.
3.4 Purchase Order Transactional Cost

Cost of a Purchase Order has been a topic of discussion for Supply Chain and Procurement professionals for decades. Organizations in various industries and sectors have been trying to figure out how much it costs to issue a Purchase Order. Most of the previous research, however, has been done on the cost of a Purchase Order on manual processing of Purchase Orders. Benchmarking was done on this topic across various industries.

APCQ (American Productivity & Quality Center) conducted a few benchmarks on the calculation of Purchase Order. The most detailed one was conducted in 2006 and states the cost of manual purchase orders to vary between $35.88 and $506.52.

According to an EPA study (1994), a purchase order costs an organization about $94.20 with a further limit that it can reach about $300. Further, ‘The Supply Management Handbook’ published by Institute for Supply Management depicts the cost of a purchase order to be between $100 and $200.

Data from CAPS research states the cost of a purchase order to be as low as $59 (Industrial Manufacturing sector) and as high as $741 (Petroleum sector) with an overall average of $217.
For the purpose of our research, the focus was to calculate the transactional cost involved in issuing a Purchase Order after an organization has already been using an ERP system to process Purchase Orders. At Company A, we decided to use the date from ‘As-Is Process Map’ in conjunction with several face-to-face interviews and ‘Gemba Walks’ that were conducted in the ‘Define’ and ‘Measure’ phase of this project. We also decided to review the timestamps in Oracle to calculate the cycle time for the process.

A total of 19,232 agreements for 2016 were reviewed. Interestingly the average cycle time came very close to the key performance indicator (KPI) of 5 days, that was tied to the bonus of employees.

However, there was a huge discrepancy between the time calculated using time stamps and the time observed for parts of the process in face-to-face interviews and ‘Gemba Walks’.

It was observed that often a simple Purchase Order would be marked as a Master Services Agreement (MSA). Upon further investigation, it was found out that this was being done as for simple Purchase Orders, the Purchasing Agents were expected to complete the sourcing part of the requisition -to-check process within 5 days. Their annual performance and the associated bonus was tied to this key performance indicator. On an annual basis, the company would evaluate the average days for sourcing process for each Purchasing Agent, based on the total number of Purchase Orders.
To maintain their performance and to circumvent the issue of not meeting the KPI of 5 days, the Purchasing Agents would mark the simple purchase order as an MSA in the system, which was omitted from the calculations conducted by the ERP. Interestingly everyone was aware of this practice.

In any case, we used two approaches to calculate the transactional cost of a Purchase Order: Top Down and Bottom Up. In Top-Down approach, the formula for cost of a Purchase Order is:

\[
\text{Transactional Cost of Purchase Order (C)} = \frac{\text{Labor Cost (L)} + \text{Non-labor Cost (NL)}}{\text{Total Number of Purchase Orders processed in a time frame (P)}}
\]

Labor Cost (L) is sum total of all the labor cost for the employees that contribute their efforts in the Procurement process. It is not as easy as it sounds to get information on labor cost, because only selected few groups, such as Human Resources and Finance, have information on the salary of the employees of an organization. Therefore, it is always recommended that someone from finance team is involved in the Lean Six Sigma team from the get-go to provide all the required information and also validate the numbers.

At company A, the core team had an analyst from finance team who could provide the information needed. But even then, it gets a bit complicated. It is not generally tolerated in private sector to share the salary of employees with other employees. In public sector, it is often available on government websites. In private sector, however, Finance and HR provides salary information, if and only if, there are multiple employees with the same level and title. Otherwise, they are very hesitant to share the data.
At company A, there were 4 groups within the larger Purchasing department that contributed their efforts towards the Purchasing process. We interviewed several members of each of the 4 groups to reach a consensus on the percentage of the time each group spent on the requisition-to-check process. It would be inappropriate to take the salary of all the individuals who work in the Purchasing department and assume that they are making contributions towards the requisition-to-check process.

The 4 groups in Company A were:

1. Purchasing Agents
2. Purchasing Analytics team
3. Supplier Diversity team
4. Purchasing Quality team

After comprehensive brainstorming with key individuals and Purchasing Operations and Leadership team, it was determined that all the Purchasing Agents contributed 100% of their time towards the requisition-to-check process. Members of Purchasing Analytics team had 75% contribution towards requisition to-check process and rest of 25% towards other activities not directly related to requisition to-check process. The Supplier Diversity team contributed only 50% of their time towards the requisition-to-check process. Purchasing Quality team was an interesting one. It had 6 members. 2 of them were determined to contribute 50% of their time and other 3 were contributing only 25% of their time towards requisition-to-check and one was not dedicated at all to the requisition-to-check process.
to-check process. This information, while subjective, is extremely important as it helped
the team to determine the salary component that was being disbursed on the processing of
a Purchase Order.

As mentioned above, finance team will only provide the average salary per title and it is
the responsibility of Lean Six Sigma team to take the weighted average to reach the total
amounts.

Further, just getting the average salary and getting the weighted average per title and
grade is not enough. The salary obtained that way is known as ‘non-loaded
compensation’.

Usually, each organization has a fringe benefit load rate factor for all the benefits that
they offer to its employees. The usual benefits offered (in North America) are:

- Worker’s Compensation
- Unemployment Compensation
- Health Plans (Medical and Dental)
- Retirement Plans
- Social Security
- Medicare
- Separation Leave

To calculate the overall total Labor Cost (L), one must calculate loaded labor cost,
inclusive of the fringe benefit load rate. The fringe benefit load rate factor ranges
anywhere from .40 to .80 depending on the sector and company and usually HR & finance department determines it for every year and can provide this number to Lean Six Sigma team. For Company A, the fringe benefit load rate factor was .72.

Table 3.2 on the following page shows detailed calculations for calculating Total Labor Cost (L) inclusive of a fringe benefit load rate factor at Company A. It will be shown on the next page, that Labor Cost (L) = $8,287,390.5. However, this calculation is only for 10 months, as the data provided was for 10 months. We annualized the data and the annualized cost of labor was $9,944,869.
<table>
<thead>
<tr>
<th>Description</th>
<th>No. of people (A)</th>
<th>% of Efforts towards requisition to-check process (B)</th>
<th>Average Salary (Weighted average) (C)</th>
<th>Total Labor Charges (E) = (B) x (C) x (D)</th>
<th>Total Loaded Labor Charges (F) = (E) x Fringe Benefit Load Rate factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchasing Agents</td>
<td>36</td>
<td>100%</td>
<td>$92,850</td>
<td>$3,342,600</td>
<td>$5,749,272</td>
</tr>
<tr>
<td>Purchasing Analytics Team</td>
<td>12</td>
<td>100%</td>
<td>$86,149</td>
<td>$1,033,788</td>
<td>$1,778,115</td>
</tr>
<tr>
<td>Supplier Diversity Program</td>
<td>6</td>
<td>50%</td>
<td>$93,200</td>
<td>$279,600</td>
<td>$480,912</td>
</tr>
<tr>
<td>Purchasing Quality Team ~ Vendor Performance</td>
<td>2</td>
<td>50%</td>
<td>$89,950</td>
<td>$89,950</td>
<td>$154,714</td>
</tr>
<tr>
<td>Purchasing Quality Team ~ QC</td>
<td>3</td>
<td>25%</td>
<td>$96,417</td>
<td>$72,312.5</td>
<td>$124,377.5</td>
</tr>
<tr>
<td>Purchasing Quality Team ~ Management</td>
<td>1</td>
<td>0%</td>
<td>$124,580</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
<td></td>
<td></td>
<td>$8,287,390.5</td>
<td></td>
</tr>
</tbody>
</table>
For Non-Labor Costs, it is a subjective approach that organizations take. However, as a best practice in Lean Six Sigma, it is advised to take into account every cost element that can be calculated.

Therefore, for Company A Purchasing process, we listed down the following non-labor cost elements and sought information to collect it.

- ERP component of the Purchasing department
- Ariba or any other Purchasing software’s
- Telecom Charges
- Facilities Charges
- Transportation Charges
- Other Clearing Charges

Most of the companies have an FTT (Facilities, Telecom, and Transportation) charge and once again, the finance department has the information on the portion of FTT for each budget center. Further, often companies maintain clearing account to collect money from several business units for their share of common expenses outside FTT.
The following information was obtained after much research from several people and systems:

Table 3.3: Non-Labor Cost component of Cost of Purchase Order in Company A

<table>
<thead>
<tr>
<th>Description</th>
<th>Charge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchasing Software 1</td>
<td>$114,500</td>
</tr>
<tr>
<td>Purchasing Software 2</td>
<td>$185,000</td>
</tr>
<tr>
<td>ERP Component</td>
<td>$380,000</td>
</tr>
<tr>
<td>Facilities</td>
<td>$585,600</td>
</tr>
<tr>
<td>Transportation</td>
<td>$18,000</td>
</tr>
<tr>
<td>Telecom</td>
<td>$90,000</td>
</tr>
<tr>
<td>Other clearing charges</td>
<td>$108,320</td>
</tr>
<tr>
<td>Total</td>
<td>$1,481,420</td>
</tr>
</tbody>
</table>

Therefore, Total Non-Labor Cost (NL) is $1,481,420

We know that L on an annualized basis is $9,944,869

Reviewing the data from ERP system we were able to find out that in that particular year, Company A processed 9,825 Purchase Orders. Therefore, P = 9,825

Transaction Cost of Purchase Order \( (C) = \frac{\text{Labor Cost (L)} + \text{Non-labor Cost (NL)}}{\text{Total Number of Purchase Orders processed in a time frame (P)}} \)
Transactional Cost of Purchase Order \( C \) = \( \frac{9,944,869 + 1,481,420}{9825} \)

"Transaction Cost of Purchase Order \( C \)" = $1,162.98

This model has several shortcomings, however. We assumed that all purchase orders have same complexity when in reality they don’t.

This is why we also tried a bottom-up approach, where we assigned cycle time to each sub-process and assigned salary component to each sub-process. However, the fallacy with that model was that to meet the organizational KPI of 5 days, the data was showing average cycle time for 5 days for all purchase orders.

This further indicated that organizational culture played a significant role in the manner, in which the data was being recorded by the company in its ERP system.

3.5 Background on Study 2: Facilities Work Order process in Company B

For study 2, we reviewed and deployed Lean Six Sigma for facilities work order process in Company B. Companies use the concept of work order or service requests in several departments, such as IT, to solve issues related to software and hardware; Facilities, to resolve issues related to facilities and telecom; Human Resources, to respond to queries related to Human Resources, such as benefits, vacation, etc.
For Company B, the process of initiating a work order (some of the other common terms used in the industry are service request or heat ticket) in response to employees needs as it relates to Facilities, was studied. Some of the common examples when an employee needed the services of Facilities department and initiate a work order included, lamp in the office of an employee not working; the restroom not working the way it’s supposed to; the elevator in the building not working. In each of these and many other related situations, Company B required the employees to submit a work order, which basically was a request intake process to record what the issue was. Most of the companies, including Company B, use some sort of queuing software to allow the users /employees to initiate a work order.

The process started when the request to perform a repair or replace a defective part was submitted by the end user. The process ended when the repair was completed and a work order was closed out in the system. Company B had several storage locations where it stored its assets and managed inventory for the company’s various locations. It used an inventory management software and also an asset management software to manage the inventory of parts throughout the company. The Facilities department was responsible for the work order process and was appropriately staffed with several managers, supervisors, mechanics, inventory analysts, data analysts, and specialists from different trades (plumbers, electricians, general contractors etc.).
Still, the overall perception of the stakeholders (company employees) was that the whole work order process was a ‘black hole’. There was a lack of communication and it was perceived that internal customer and users of the process were not happy. A cross-functional Lean Six Sigma team was put together, that comprised of two Facilities Supervisors, two Facilities Managers and one Lean Six Sigma Master Black belt.

Unlike Company A, the focus was not on deploying Lean Six Sigma for the long run, rather the mission was to apply Lean Six Sigma methodology and get the most benefit out of it in the shortest amount of time.

It is also worth noting that no vetting process was followed to identify the candidates for training. Rather, the supervisors were told that they have to attend the training. A brief 3-day training was provided to about 8 individuals in the Facilities department. This was done at the ‘Yellow Belt’ level. The purpose of this training was to make sure that supervisors understand and speak the language of Lean Six Sigma. The core team members were further trained by Master Black Belt on the job. Director of Facilities was brought in as the Sponsor of the project. Another Director of Operations was tagged in, and both the Directors were tasked with the responsibilities that a steering committee fulfills.

Lean Six Sigma team drafted an ‘Opportunity Statement’. The standard terminology of ‘problem statement’ was altered to make sure that Director of Facilities and Vice President of Facilities did not feel offended, as they both had been with the company and the organization for major part of their career and took pride in the work their team did.
The term “problem” was demeaning to them. As a result, the team decided to change the term to an ‘Opportunity statement’, which is below:

“Optimize the Facilities Work Management process to increase effectiveness in resource planning, asset management, and customer communication”

The key goals and objectives of the project were to:

- Conduct Value Stream Analysis for the process.
- Benchmark industry standards in resource planning, asset management, and customer communication.
- Establish a baseline of customer satisfaction, transaction cost, cycle time.

The key deliverables expected from project team were:

- Improved Customer satisfaction by 10%
- Improved Process Cycle time by 10%
- Reduced cost to transact and manage assets by 15%
- Accountability of Assets and resources
- Standardized Procedures

The team decided that only the inventory management related to work order process would be in scope.

The Process start point was determined to be the point when an end user reports an issue by submitting a work order or a service request in the work order system.
The process end point was determined to be the point when the work order was closed in the system by a staff member of Facilities department.

The team made the following assumptions and they were reviewed and approved by the steering committee:

- Current staffing levels won’t increase
- Customer Satisfaction will be maintained
- Current technology and inventory and asset management systems will be used in the future process

Following risks and constraints were identified:

- Union Contract & its impact
- Employee Skills
- Inventory Management System may not have all the features that we need in the To-Be process.
3.6 Study 2: Data Collection & Analysis

3.6.1 Study 2: Voice of Customer interviews

As discussed in Study 1, collecting voice of the customer is fundamental to assess the baseline and gauge the perception of the process. Lean Six Sigma team surveyed the key internal customers through a survey instrument, which had several open-ended questions followed by 7 rating questions, that used a linear scale of 1 to 5.

The feedback was collected using face-to-face interviews as well as emails, where the questionnaire was sent to the respondents and they were asked to fill it back and send to Lean Six Sigma team. 58 respondents participated in the survey.

![Figure 3.6: Results of the index questions from 58 respondents at Company B](image)
7 questions that were rating based, along with the average score received (on a scale of 1 to 5 (5 being higher rating) were:

- Are you satisfied with communication from the Facilities staff?
  - 4.125

- Are you satisfied with helpfulness/courtesy of the Facilities staff?
  - 4.458

- Are you satisfied with the successful resolution of the issues?
  - 4.085

- Are you satisfied with the timeline associated with the resolution of your issues?
  - 3.833

- Are you satisfied with the process of submitting a work request using the web portal?
  - 4

- Are you satisfied with the available fields and the information required to submit the Work Request?
  - 3.667

- Rate your overall satisfaction or dissatisfaction with the Facilities Work Request process.
  - 4.0417

The overall customer satisfaction index, calculated by using an average of averages was 4.01, again on a scale of 1 to 5. The complete survey to gauge customer satisfaction related to the facilities work order process at Company B is included in Appendix-4.
Key points from the collected feedback were:

- Most of the respondents were frustrated with receiving no or minimal notification of receipt of the work request.
- Most of the respondents were not aware of the classification process of work requests into routine vs non-routine.
- Several respondents stated that they were not aware of their key contact in Facilities.
- A consistent theme was that communication could be improved.
- One of the most interesting feedback was around a survey that the work request system automatically sent out to the requester. However, the respondents shared that they did not receive the survey every single time they submitted a work request. Further, they stated no one ever got back to them about the feedback they gave. When we investigated this, we discovered that most of the staff members in facilities department were not fully aware of the survey process themselves.

In addition to the VOC surveys, several ‘Gemba Walks’ were conducted to collect further data about the current process. In almost all the ‘Gemba Walks’, it was observed that the teams working in the facilities department were aware that the perception of their services was not the best companywide and that there was an opportunity for improvement.
However, almost every team member in every ‘Gemba Walk’ also consistently blamed the asset management system that was being used by the company. Between the ‘Gemba Walks’ and our meetings with Director and Vice President of Facilities, we learned that there was a business case pending with senior management to purchase a new asset management system. While this information was initially not shared with Lean Six Sigma team, we decided to get more information on it in our ‘Define’ and ‘Measure’ phases.

Upon further research, it was found that there was a proposal to buy a new asset management system that would cost the company upwards of $2M. It was being portrayed as a fix-it-all solution to all the existing problems. From an organizational cultural standpoint, it was a very interesting observation that there was an extremely strong groupthink going on across the facilities organization and from top to bottom, there was a mindset that the solution to the problem was replacing the asset management system.

The Lean Six Sigma team tried to conduct an ‘As-Is Process Mapping’ workshop to record the current process. Unlike Study 1, in Company B, the team was itself responsible to request the attendees and ensure they come. The sponsor or champion did not send any communication upfront about the significance of the workshop. As a result, most of the managers declined the meeting despite several requests due to the nature of their job and how busy they were. Some of the warehouse managers sent their substitutes and some offered to review the process map once it was completed. Post-it notes were used to map the process. However, it was further found out that most of the warehouses had their own process.
3.6.2 Study 2: SIPOC

As a result, the team decided to focus on SIPOC, which is another tool that Lean Six Sigma teams use to get a broader snapshot of the process and also capture the inputs, outputs, and stakeholders to the process.

Figure 3.7 shows the SIPOC diagram for Facilities Work Order process for Company B.

![SIPOC Diagram]

Figure 3.7: SIPOC for Facilities work order process at Company B

SIPOC provides an information on the process and as demonstrated in figure 3.7, we can see that process begins when a request is submitted and then a work order is generated based on the request. A supervisor then evaluates the job and assigns the job to a mechanic or an external vendor. Following this step, work is performed by the vendor or the mechanic and work order is eventually closed.
The inputs to this process are various material and tools needed to execute work. The actual work order, operation procedures, and the ERP system are also inputs. The requester, supervisor, mechanic, clerk are all internal suppliers of the inputs and vendors and contractors are external suppliers.

The outputs from the process are work order number, completed work, scrap material, and at times purchase order number, especially if the material is needed. Customers of the outputs are similar groups that we see in the suppliers.

The most effective outcome of this effort was that the vendor emerged as one of the inputs and outputs to the process. This allowed the Lean Six Sigma team to initiate a discussion with the vendor for asset management system. We will discuss the implications of those discussions in Chapter 4 when we discuss the results.

3.7 Study 2: VOC based on existing data collected by Asset Management system

In the meanwhile, the team researched and found the information stored on the asset management system for last 6 years for the surveys that were being collected by the asset management system.

2,112 surveys were received by facilities in the preceding 6 years. Of these 2,112 surveys, 1,354 contained written comments. Overall, customer satisfaction was measured by customer satisfaction index (poll of polls) and critical success factors that emerged out were: Communication, Timeliness, and Quality of job done.
The survey used the following rating:

1- Extremely Dis-satisfied
2- Dis-satisfied
3- Neutral
4- Satisfied
5- Very Satisfied

For any team, the desired customer satisfaction index should range at least Satisfied or above. The team did an analysis on ratings with anything above a rating of 4 as favorable and anything below 4 as not favorable.

Figure 3.8: Analysis on company B facilities survey
Further, regression analysis was conducted to analyze the relationship between the custom satisfaction index and each of the critical success factors. A strong relationship was observed between Customer Satisfaction Index and Critical Success Factors (Quality, Timeliness, and Communication).

Communication emerged as the most statistically significant Critical Success Factor. Interestingly, it also negatively impacted Quality and Timeliness.

Both Quality and Timeliness increased the Customer Satisfaction Index by 0.71 and 0.54 respectively.

Lack of communication decreased the Customer Satisfaction Index by 1.32.

The data indicated that by improving communication score will have the highest positive impact on customer satisfaction. In other words, if the Facilities team would enhance the communication to its internal customers in a timely fashion, even if the work was not completed, the customers will still feel satisfied to some extent.

This data analysis proved to be extremely beneficial to validate the issues and KPI’s in the project charter and also prioritize the issues that the team was dealing with.

Further reading over 1,000 comments provided a lot of insight into the what the stakeholders were really demanding for years. Another observation made was that over 40% of the respondents were actually members of the facilities team. Upon research, it was found out that, it was not uncommon for the facilities team to be approached either in person or over the phone by the company employees about an issue and the facilities team members would then submit the work order on behalf of those employees.
As a result, the asset management system would not send the survey to the user, rather to the facilities team member who had initiated the work order in the system.

We did a couple of focus groups asking the team members if they submitted the responses themselves and while some agreed, most of them refused. Further, those who accepted responding to surveys themselves, insisted that they responded accurately.

The team had a way to conduct further data analysis and identify the names but decided to agree that the results would have some bias and decided to keep that in the mind while working on the solutions.

The team conducted root cause analysis focusing on the enhancement of three Critical Success Factors (Quality, Timeliness, and Communication).

The four key categories that were identified as key root causes were:

1. Work Request System Configuration
2. Vendor Management
3. Environment & Culture
4. Staffing

While the facilities team had a solution planned, Lean Six Sigma team conducted a capabilities analysis of the asset management system the company was currently using. Meetings were held with the provider of the software and also with the competitors to understand the landscape of this sector.
In terms of the three critical success factors, the root causes within the system that contributed to inefficiencies were:

- Lack of notification or acknowledgment of work order/request by a user
- Inefficient query issues
- Lack of integration with outlook and other databases

The key root causes in Vendor Management were:

- Inefficient Inventory Management
  - Lack of hub and spoke model
  - Inability to review inventory levels of an item at other locations
  - Lack of uniformity in equipment and materials
  - Lack of standardized re-ordering process

- Inefficient Procurement Process
  - Delays in regular items based on unknown restrictions from Procurement
  - Spot-buy issues
  - Constant adjustment of Purchase Orders needed

The other two categories Environment/Culture and Staffing were developed separately but the elements within them were all part of the organizational cultural issues.
Some of the key issues were:

- Multiple layers to get things done
- Lack of communication between different warehouses and departments
- An excessive number of validations
- Lack of employee development and morale
- Lack of resources
- Lack of collaboration and sharing of knowledge across various regions
- Inefficient resource planning
  - No job descriptions, time expectancies etc.

In Company B, the candidates were not chosen through a vetting process as they were in Company A. As a result, they were not as motivated in Company B, as they were in Company A. The training itself was challenging and the discussions were not as thought-provoking as they were in Company A.

Further, in Company B, the fact that the team could not even follow the standard practice and call the problem statement problem statement speaks volumes of influence organizational culture had on the deployment of Lean Six Sigma and its outcomes.
3.8 Background on Study 3: Mail Process in Company C

Every company receives and send mail. Companies receive mail from their customers and other businesses. Similarly, they send mail to their customers as well as businesses.

While at the onset, mail distribution process appears to be very simple, we found that the mail operations at Company C were as complex as layers of onions.

There were three types of mail at Company C.

1. External Mail
   a. This was the mail that was either being received or sent out from outside the company.

2. Inter-Office Mail
   a. Company C had many offices across the region. Inter-office mail comprised of all the mail that was sent by the employees of Company C to its associates across other locations. The company used its own mail employees and mail vans to transfer the mail to the various offices.

3. Intra-Office Mail
   a. This comprised of all the mail that was hand delivered by mail employees between various floors and offices within the same building. While it may sound very odd in this day and age, but Company C still practiced it.
The overall perception in the company was that the ‘Mail’ department was overstaffed and was not adding any value. The Vice President of Operations wanted to get rid of the Mail department completely but he could not do that, due to culture challenges, as the company had a unionized workforce.

After meetings, it was decided to deploy Lean Six Sigma methodology to evaluate mail as a function.

A cross-functional team was formed which comprised of a Lean Six Sigma trained professional, Manager of Mail department at Company C, two analysts of Mail department and two individuals from Operations team.

The problem statement was drafted as:

“Identify, streamline and standardize processes within Mail Operations to enhance customer experience, reduce transactional cost and optimize volume processed while maintaining safety, corporate and regulatory requirements”

The key goals and objectives of the project were defined as:

- Establish and improve baseline for: volume of processed mail, processing time/cycle time, average unit processing cost, average number of processed units per individual
- Increase customer satisfaction
- Evaluate staffing capabilities
- Conduct benchmark for equipment and services
- Develop a communications and control plan
The key deliverables expected from project team were:

- ‘As-Is’ and streamlined process maps
- Reduce volume processed by 15%
- Increase process yield by 15%
- Reduce average processing cost by 10%
- An optimized model that can be replicated at other facilities
- Staffing plan to enable cross-training and backup.

The team decided that the following would be in the scope of the project:
Mail process at all locations of Company C; mapping routes of vendors and any incoming and outgoing mail to and from locations at Company

Further, it was decided that the following would not be in the scope of the project team:
Mail processes at a few satellite offices in the southwest United States

The Process start point was determined to be the point when a piece of mail was received by mail personnel at the company location. The process end point was determined to be the point when the received mail had been distributed to end user or to the designated location for that department or business unit.
The team made the following assumptions:

- Current staffing levels will not increase
- Employees will continue using service for personal purposes

Following risks and constraints were identified:

- Equipment limitations
- Employee skills
- Company culture
- Union contract (employees limited to functions within the title)
- Space

3.9 Study 3: Data Collection & Analysis

3.9.1 Study 3: Voice of Customer interviews

The Lean Six Sigma team conducted 23 ‘Gemba Walks’ and 82 Voice of Customer (VOC) interviews.

The team conducted extensive data analysis to identify departments and individuals within those departments to shortlist those who either received or sent most mail throughout the company headquarters. Based on the data, the candidates were selected for collecting the voice of customer.
Key departments selected were:

- Law
- Accounts Payable
- Customer Operations
- Treasury Department

A combination of open-ended and rating questions was asked to the stakeholders. A total of 7 rating questions were asked to calculate the overall customer satisfaction index for mail process. A straight scale of 1 to 5 was used for rating questions, with the following labels:

1. Strongly Dissatisfied
2. Dissatisfied
3. Neutral
4. Satisfied
5. Strongly Satisfied

![Graph of index questions results](image.png)

*Figure 3.9: Results of the index questions from respondents at Company C*
Overall customer satisfaction index was calculated to be 3.97.

The questions asked along with the average scores were:

- Are you satisfied with helpfulness/courtesy of the Mail Operations staff?
  - 4.28
- Are you satisfied with the efficiency of the Mail Operations staff?
  - 3.78
- Are you satisfied with the timeline associated with the processing of outgoing mail?
  - 4.17
- Are you satisfied with the timeline associated with the delivery of inter-office mail?
  - 3.59
- Are you satisfied with communication from the Mail Operations staff?
  - 4.12
- Are you satisfied with the process of sending and receiving mail (inter-office, intra-office and outside mail and packages)?
  - 3.94
- Rate your overall satisfaction or dissatisfaction with the Mail Distribution process.
  - 3.94
Open-ended questions included a range of questions that assessed the responsibilities of the individual in the organization and areas he/she was responsible for, along with the frequency of receiving or sending mail on a periodic basis and familiarity with locations where the mail was dropped or picked up. The team also tried to test the value of getting personal mail delivered in the office, from an employee perspective.

Key themes from the feedback received from open-ended question were:

- Overall customer satisfaction with mailroom efficiency was good.
- Most employees that were interviewed indicated that they were notified when a package was delivered to them at the loading dock. However, no such notification was provided for a piece of mail.
- Majority of the employees interviewed were unfamiliar with the use of loading dock and actually the existence of the policy of the company where any package above 15 lbs. was automatically considered a package instead of mail and handled by warehousing instead of mail department.
- When it came to the use of personal mail and its delivery, most of the employees interviewed did not admit using the service, however, some saw the value of the service. However, consistently across the board, the employees responded that it doesn’t cost anything to the company, so why even discontinue it.
- There was a consistent concern around the lag with express mail where items sent overnight were received 2-3 days later. The team also conducted an exercise which will be discussed later in section 3.10 and also reviewed the dates when the
newspapers were delivered to the offices of executives. On an average, the executives were being delivered the newspapers with a delay of 3 days.

A full list of open-ended questions, along with the survey questionnaire is included as Appendix-5.

The Lean Six Sigma team at Company C used the SIPOC tool to understand the process at a higher level and also to capture all the key stakeholders and external vendors.

![Figure 3.10: SIPOC for Mail process at Company C](image-url)
### 3.9.2 Study 3: Gemba Walks

Based on the information gathered from data analysis, Lean Six Sigma team identified several company locations of Company C to conduct ‘Gemba Walks’ and observed the process of receiving and sending mail and related packages. Interestingly with the exception of headquarters and another facility, there really was no process in other company-owned locations. In the headquarters and other location (let’s call it facility B) that served as a hub, there was dedicated mail personnel. In headquarters, there were dedicated mail runners, people who would actually deliver the company had somewhat of a formalized process.

However, in most of the other locations, there was no formal function and individual to receive or send mail. Mail packages and pieces were dropped by employees at the outgoing location where FedEx, UPS, USPS and other mail carriers would pick and drop the mails and packages. Since there was no individual responsible for picking the mail and/or packages delivered, unless there was a mail that required signatures, it was technically delivered to the location, but it was quite possible that it was either not distributed in a timely fashion or never distributed at all, because the employees were not coming to the location looking for their package or mail on a frequent basis.

The team through the ‘Gemba Walks’ saved Company C thousands of dollars, since, in three different occasions, the team members, one of whom was with Mail team and
authorized to open the mail, would open the mail envelopes addressed to Accounts Receivable and found checks made to the company worth thousands of dollars. In another occasion, a former employee of Company C had sent documents related to litigation against the company. All the legal documents related to the lawsuit and eventually, a default judgment was also found in a remote location.

An ‘As-Is Process Mapping’ workshop, very similar in manner to Company A was planned for Company C’s mail process. There was some level of support by the leadership at the middle management level. The Mail manager was very supportive of the changes. However, the staff that reported to him was all unionized and one of the members reported the workshop to a union steward.

Unbeknownst to the team, the union steward was present in the workshop room. It caused quite a lot of tension for everyone present and the team could not openly ask the questions. In one of the incidents, a Lean Six Sigma team member tried to take a picture of the process mapping and the team member was apprehended by the union steward and was asked to delete the picture as it was taken without the permission of union members in the room. Eventually, the Lean Six Sigma team had to conduct the process map under a lot of duress and capture whatever they could.

There was actually a second process mapping workshop conducted, in confidence, and in which no one besides the management (non-union) professionals were invited. Unfortunately, the team could only conduct process mapping on the process followed in the headquarters and the staff from other locations was not invited, after the incident.
Further, when conducting value stream mapping, the team was advised to be very mindful of the union repercussions and as a result, the team could never share the actual value stream mapping with the company.

The figure on the following page demonstrates the ‘As-Is Process Map’ for Mail distribution at Company C.
Figure 3.11: As-Is Process Map for Mail process at Company C
3.9.3 Study 3: Root Cause Analysis

When the team conducted root cause analysis, it used the same approach at the direction of author, that was used for Companies A and B.

Figure 3.12: Root Cause Analysis for Mail process at Company C
While the tool used was the same, the application was not, and the key difference was the cultural pressure under which the team was working. The team was being continuously reminded to be politically correct and watchful of union implications. The members of senior management would drop by every now and then, however, the team was not encouraged by the visits. On the contrary, the Lean Six Sigma team was disheartened every time.

In any case, the key categories that were identified as key root causes were:

1. Environment / Culture
2. Staffing
3. Material
4. Machine
5. Intra and Inter-Office Mail

With the exception of the last category, all the other 4 categories were somehow deeply influenced by organizational culture.

Key issues identified for Environmental/Culture were:

- Organizational Culture in other locations didn’t align with headquarters.
- Lack of support from senior management.
- Lack of understanding as it related to the needs and purpose of Mail.
- No analysis of business critical and non-business critical mail (magazines and newspapers etc.).
The key root causes in Staffing category were:

- The gap in skill set
  - The root cause to this was identified as a gap in knowledge, skills, and ability.
  - Further, it was identified that there was no job fitness evaluation.
  - Also, staff was migrated from other areas.

- Attrition without replacement
  - Root causes to this were identified as lack of workload analysis and lack of cross-functional skills and lack of training.

The key root causes in the Material category were:

- Expectations to pick toner cartridges, where mail staff would deliver mail and pick up ink cartridges
  - The root cause to this was identified as unclear roles and responsibilities.

- Expectations to paste labor laws, where mail staff was required to paste and update labor law posters at specific locations
  - The root cause to this was identified as unclear roles and responsibilities.
The key root causes in Machine category were:

- Lack of alignment of alignment with the company database
  - The root cause to this was identified as:
    - lack of training to staff, the person who retired took all the knowledge with him.
    - unclear policies as IT referred to some policies that were not found that prohibited alignment.

Intra and Inter-Office Mail was a big issue in itself and in order to collect further data about it, the team conducted an experiment on Inter-office mail. It is covered in section 3.10

### 3.10 Study 3: Experimental Study

In order to closely study the complexities of inter-office mail, the team studied the volume of mail and the process of sending and receiving inter-office mail. Altogether Company C had almost 15 locations. However, the majority of locations had a minimal amount of mail, even then the mail vans were scheduled to stop at every location every day.

Team members revisited the date personally visited the satellite offices and volumes of incoming and outgoing mail were counted on random days of the week. Based on that data, 6 locations were selected as high-volume locations.
To test the need and accuracy of inter-office mail, the Lean Six Sigma team decided to conduct an experiment. A sample letter was sent to all the locations of the Company C possible. Altogether 34 locations were selected. An individual was selected from each of the 34 locations, in somewhat of a random fashion. It was validated that the individual was still working with Company and had received a mail or sent mail in the last 6 months. It was ensured that individual was with management and not a unionized employee. The individual was not informed before sending out the mail, however, he/she was informed later on and was requested to not take any action and not make any visits to the location seeking the mail. A communication was formulated to explain that the team was working on the improving the process of inter-office mail and shared with all the 34 individuals.

The mailroom codes were identified and verified by the mailroom manager in the headquarters. All the 34 letters were mailed on the same day from headquarters.

The results were quite interesting.

Within 1st week, 3 out of 34 employees confirmed receiving the mail. The earliest time it took to receive the mail was 4 business days. In another week, another 4 individuals had confirmed receiving the letter. By the end of 3rd week, 2 more individuals had received the letter. In the 4th week, only 1 person confirmed receiving the letter. In the 8 weeks later, 4 more individuals confirmed receiving the letter but they all informed that they could not resist but look for the letter at the mail location themselves.

Out of 34, 6 employees never responded despite several reminders.
Figure 3.13: Number of inter-office mail pieces received per week at Company C

The figure above demonstrates the number of mail pieces that were confirmed to be delivered, per week. It is interesting to point out that out of the 34 pieces of inter-office mail that were sent out from headquarters, only 14 were received after 8 weeks. The mail manager at headquarters confirmed that all the letters were indeed picked up by different mail vans on the same day. Even if we exclude the 6 individuals who never responded, 28 pieces should have been received. 14 individuals never received the mail. Figures 3.14 and 3.15 show the delivery rate of inter-office mail for both the scenarios: 3.14 includes all 34 mail pieces and 3.15 does not include the 6 pieces for the individuals who never responded.
Figure 3.14: Delivery of inter-office mail at Company C (includes all the mail pieces in the experiment)

Figure 3.15: Delivery of inter-office mail at Company C (does not include the mail pieces for individuals who never confirmed, in the experiment)

We compared this to fill rate scenario of inventory management and concluded that at the current rate, the mail operations, in particular, the inter-office mail was not performing at all.
CHAPTER 4

RESULTS

4.1 Study1: Solution Planning Matrix

Solution planning workshop is the third major milestone in a Lean Six Sigma project. The Lean Six Sigma team at Company A devoted the resources and put in the efforts to brainstorm all the data collected between ‘Define’, ‘Measure’ and ‘Analyze’ phases. In particular, the root cause analysis diagram was reviewed in detail and a solution was thought for each of the root causes.

The solutions were then prioritized using an Impact/Effort matrix. An Impact/Effort matrix is a tool that assists Lean Six Sigma teams in prioritizing the number of solutions against various criteria that are defined by the teams in agreement with the process owners. It is worthwhile to note that organizational culture must be kept in mind when selecting criteria and its weight, however, in most cases, the organizations neglect to do so.

The factors that contribute to efforts are all the items an organization should consider from an input perspective. For example, cost, time, team etc. are all efforts that an organization may need to put in to achieve a solution. The impact of a solution is the benefit (tangible and intangible) that an organization is likely to gain from implementing a solution.
In reality, each solution or set of solutions can be viewed as a project and in order for it to be successfully achieved and implemented, there should be accountability and it is advisable to have a Project manager leading a solution or set of solutions.

In Company A, the weighting for efforts was agreed upon as follows:

- Cultural Barriers: 30%
- Cost: 35%
- Time: 20%
- System Barriers: 15%

The weighting for criteria related to Impact was agreed upon as follows:

- Cost: 35%
- Time: 25%
- Customer satisfaction: 30%
- Morale: 10%

While reviewing the data and root cause analysis diagram, the Lean Six Sigma team identified 62 solutions for the Purchasing process at Company A. The core team spent two days brainstorming solutions and then rating them on the criteria mentioned above.

They were plotted on the Impact / Effort matrix as shown below in Figure 4.1. Each solution was rated on a scale of 1 to 5 by the core team members until a consensus was reached.
Further, following the best practice approach, the team categorized the 62 solutions into 9 themes. These 9 themes were:

- Category Management
- Communication
- Supplier Management
- Terms & Conditions
- Approvals
- Training
- Process
- Outsourcing
- ERP

Figure 4.1: Impact/Effort Matric for all solutions brainstormed for Purchasing process at Company A
Figure 4.2 below exhibits the categorization of 62 solutions into various categories.

Figure 4.2: Categorization of solutions for Purchasing process at Company A

The support of the leadership and complementary culture of the organization was quite visible throughout the exercise as the team members it was an extremely thought-provoking process and the entire team participated openly without having to think about political repercussions.

Impact/Effort analysis assisted the team in prioritizing the solutions in terms of which ones should be done before others. For example, a solution which was low effort but high impact was termed as a ‘quick win’. At the same time, consensus and alignment from the
process owners and the stakeholders ensured that the team did not miss anything that was absolutely required.

4.2 Study 1: Strategic Sourcing and Category Management

The team decided to work on category management and procurement value proposition for the first 6 months. Category management was prioritized because it was related to many solutions and covered broader themes ranging from Category Management to Supplier Management to Terms & Conditions to Approvals, Training & Process.

For Communication, it was decided that the team will work on re-establishing the branding for Procurement department in the Company A and procurement value proposition was determined to be the ideal solution for it.

Strategic Sourcing & Category Management:

Key buyers and Purchasing managers in the department were trained in the areas of strategic sourcing and category management. Spend analysis was conducted on Company A’s spend and categorized according to several categories within direct and indirect spend. The titles of the employees in Purchasing department were changed from ‘Purchasing Agents’ to ‘Buyers’ and ‘Purchasing Managers’ to ‘Category Managers’. Each Category Manager was given a target to conduct at least 3 category strategies in their areas.
Figure 4.3: Stakeholder Engagement Matrix for Purchasing process at Company A

Category strategy for Air Travel category is included as Appendix-6. While developing category strategy, each category manager was expected to form a collaborative cross-functional team and understand the demand for what was being purchased or sourced. There was an expectation that the category manager manages all the stakeholders. A stakeholder matrix was used by category managers across the department. The category manager was also expected to conduct a thorough market analysis in the category that he or she was responsible for. Porter’s five forces analysis and other market analysis were used for achieving this goal. The purpose of conducting market analysis in category management is to better understand the supply side of what is being sourced.

While the process of developing the first few category strategies was very time consuming, the leadership team was very patient and extremely supportive and sent the right message company-wide. The first 3 category strategies were presented at the CFO
townhall. This helped Procurement department in gaining a lot of positive attention. Stakeholders who were not aware of the activities that went in Procurement realized the efforts that went in sourcing goods and services.

4.3 Study 1: Procurement Value Proposition

To further enhance the branding of Procurement department, all the category managers were asked to engage the key stakeholders and explain the process of procurement in a comprehensible manner. To achieve this, a procurement value proposition deck was put together for the procurement team. This deck explained the changes that were being brought in to the procurement department along with a brief explanation of how the procurement process works. In particular, the emphasis was laid on the fact that sourcing was not just about negotiating the cost, rather other aspects of an agreement. Further, an attempt was made to explain to the stakeholders the various activities involved in the procurement process and the associated timeline. Last but not the least, the deck also explained which activities, the procurement team was responsible for and which activities were the stakeholders responsible for. This was a much-needed step to clarify the roles and responsibilities. The procurement value proposition deck is included as Appendix-7.

One additional step that was taken at the senior management was to fast-track the procurements that were low risk. Unlike the traditional organizations, where risk is measured by the cost of procurement, the procurement team decided to adopt a modification of Failure Mode Effects Analysis (FMEA) matrix. FMEA is a risk management tool that is used by various industries and sectors and also by Lean Six Sigma teams. Procurement team at Company A was trained on how to use FMEA. This
allowed categorizing the requisitions based on a fast track or regular track. The fast track requisitions were sent to a team, that was carved out to focus only on the low-risk procurement. These fast-track buyers were generalists and not specialists in a particular category. Their average salaries were less than those of specialists, who were responsible for regular requisitions, which were assigned to category buyers and category managers, as they were deemed to be of some risk and required attention and processing by a specialist and as a result needed more processing time against fast-track requisitions.

The key performance indicators of fast track and regular requisitions was adjusted and set up separately. There were minor changes made to Procurement system, not to ERP, to ensure that the system sent automatic notifications when a requisition was received by someone in the procurement department, when it was classified as a fast-track or regular track, when it was assigned to a buyer or a manager and eventually when it was processed to the next stage. This whole process increased the level of customer satisfaction significantly.
4.4 Study 1: Revised Cost of Purchase Order

Due to all the changes that Company A made that we discussed in the section above, it was decided to calculate the revised cost of Purchase Order.

Recalling from section 3.4,

\[
\text{Transactional Cost of Purchase Order (C) = \frac{\text{Labor Cost (L) + Non-labor Cost (NL)}}{\text{Total Number of Purchase Orders processed in a time frame (P)}}}
\]

We were only able to collect the data for 6 months post the implementations of the solutions discussed above in sections 4.2 and 4.3. In those 6 months, the overall cost of labor changed just slightly. However, due to the organizational changes, the number of people who contributed to the procurement process and the weight of their time changed. In particular, the Procurement Analytics team was assigned other analysis work outside the requisition-to-check and 25% of their time was assigned to the analysis of that data. The calculations are exhibited in Table 4.1 on the next page.
Table 4.1 Revised Labor Cost component of Cost of Purchase Order in Company A

<table>
<thead>
<tr>
<th>Description</th>
<th>No. of people (B)</th>
<th>% of Efforts towards requisition to-check process (C)</th>
<th>Average Salary (Weighted average) (D)</th>
<th>Total Labor Charges (E) = (B) x (C) x (D)</th>
<th>Total Loaded Labor Charges (F) = (E) x Fringe Benefit Load Rate factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buyers &amp; Category Managers</td>
<td>22</td>
<td>100%</td>
<td>$96,564</td>
<td>$2,124,408</td>
<td>$3,653,982</td>
</tr>
<tr>
<td>Fast Track Sourcing Buyers</td>
<td>12</td>
<td>100%</td>
<td>$66,820</td>
<td>$801,840</td>
<td>$1,379,162</td>
</tr>
<tr>
<td>Procurement Analytics Team</td>
<td>14</td>
<td>75%</td>
<td>$89,595</td>
<td>$1,254,329</td>
<td>$1,618,085</td>
</tr>
<tr>
<td>Supplier Diversity Program</td>
<td>6</td>
<td>50%</td>
<td>$96,928</td>
<td>$290,784</td>
<td>$500,148</td>
</tr>
<tr>
<td>Procurement Quality Team ~ Vendor Performance</td>
<td>2</td>
<td>50%</td>
<td>$93,548</td>
<td>$93,548</td>
<td>$160,902</td>
</tr>
<tr>
<td>Procurement Quality Team ~ QC</td>
<td>3</td>
<td>25%</td>
<td>$100,273</td>
<td>$75,205</td>
<td>$129,353</td>
</tr>
<tr>
<td>Procurement Quality Team ~ Management</td>
<td>1</td>
<td>0%</td>
<td>$129,563</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
<td></td>
<td></td>
<td></td>
<td>$7,441,635</td>
</tr>
</tbody>
</table>

The revised Labor Cost, $L$ annualized based on the data collected over a period of 6 months, came out to be: $7,441,635
Table 4.2 exhibits the non-labor cost component that was also calculated after the solutions were implemented.

Table 4.2: Revised Non-Labor Cost component of Cost of Purchase Order in Company A

<table>
<thead>
<tr>
<th>Description</th>
<th>Charge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procurement Software 1</td>
<td>$114,500</td>
</tr>
<tr>
<td>Procurement Software 2</td>
<td>$185,000</td>
</tr>
<tr>
<td>ERP Component</td>
<td>$380,000</td>
</tr>
<tr>
<td>Facilities</td>
<td>$597,312</td>
</tr>
<tr>
<td>Transportation</td>
<td>$18,360</td>
</tr>
<tr>
<td>Telecom</td>
<td>$91,800</td>
</tr>
<tr>
<td>Other clearing charges</td>
<td>$110,486</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$1,497,458</strong></td>
</tr>
</tbody>
</table>

As far as the Non-Labor Cost is concerned, after adding all the components, annualized, based on the data collected for a little over 6 months, came out to be: $1,497,458

However, most interestingly, the procurement team was able to process an annualized number of 14,246 purchase orders, again based on the data in those 6 months.
Thus, revised total cost of purchase order:

\[ \text{Transactional Cost of Purchase Order (C)} = \frac{\text{Labor Cost (L)} + \text{Non-labor Cost (NL)}}{\text{Total Number of Purchase Orders processed in a time frame (P)}} \]

\[ \text{Transactional Cost of Purchase Order (C)} = \frac{7,441,635 + 1,497,458}{14246} \]

\[ \text{Transactional Cost of Purchase Order (C)} = \frac{8,939,093}{14246} \]

\[ \text{Transactional Cost of Purchase Order (C)} = $627.48 \]

From the best-in-class standpoint, the figure of $627.48 may not be ideal, however, to recall, before the solutions, were implemented, the transactional cost of Purchase Order in Company A was almost $1162.98. The new cost was 627.48. This was a decrease of $535.5 or 46% in less than a year.
4.5 Study 2: Enterprise Asset Management System

For study 2, at Company B, after a lot of resistance from the facilities leadership team, the provider of the current asset management software was brought in to pitch in the capabilities of the system that Company B currently had. In the meanwhile, the team put together a list of requirements based on all the feedback that was collected from the voice of customer interviews, ‘Gemba Walks’, and benchmarking. This list was then verified with the facilities team and checked with the current system that the Company B owned.

Interestingly, most of the requirements were being met with the system the company had.

Training was arranged and provided by the provider of the current asset management software in a phased approach to all the facilities managers, supervisors and selected levels below supervisors.

Further, an additional module of the current software was purchased which cost Company B $18,000. This module allowed Company B to set up a hub and spoke module for inventory management, where the largest store in the headquarters was set up as a hub and an additional site was also set up as a hub and all the additional smaller storage areas were set up as a spoke.

The biggest challenge with hub and spoke is to maintain accurate inventory. Inventory cycle counts were conducted in a phased approach at Company B.
To begin with, a portion of largest storage area in headquarters was selected for cycle count. Teams were paid overtime and provided free lunch as an incentive. Facilities managers and Lean Six Sigma team members, along with a representative from the provider of the current asset management software were present to ensure accurate count is taking place and recording is taking place in the system. ‘First in First out’ was followed to set up space.

Following the success of the selected area, the facilities leadership team gave the approval to move ahead with other areas. Areas were tackled concurrently in the headquarters. MRO area was outsourced. Another area which had copper pipes and electrical conduits lying around for years was cleaned and procurement team was asked to help dispose-off the material through the vendor which had an agreement with Company B.

In doing all of the above, less than $100,000 was spent. This figure included the time spent on training as well as time spent on doing cycle counts. However, this allowed the company to avoid purchasing a new Asset Management system for almost $2M.

It took months before hub and spoke model was put in place by the asset management vendor and inventory was transparent across the company.

It was at this point when the Vice President of Facilities was convinced that there was no need to source a new asset management system.
4.6 Study 2: Revised KPI’s

Further, changes were made to the system to ensure that the survey was sent out every time a work request was completed and a new field was added where even if the work request was submitted by facilities staff, the system had an option to intake the email address of the stakeholder, who needed the work done. Therefore, the survey was sent to stakeholders and not facilities staff.

KPIs’ were also re-written based on the customer feedback as well. Whereas the facilities team was somehow managing the data to make sure it was adhering to the KPI of getting a work request completed within 5 days, the KPI around work order was moved from a number of days to accurate completion.

At Company B, when the training was done, no vetting was done like company A. The optimism of the candidates who were trained was extremely low. They were not at all interested in getting trained and there were very low participation and no collaboration. Further, the decision to purchase the new asset management software from top-down seemed inevitable. However, in just a few months, with Lean Six Sigma training and deployment, we could see some changes in the leadership style of senior management as well as middle managers in the company.
4.7 Study 3: Interim Solution: Application of Traveling salesman problem to mail routes

Company C focused its efforts on Inter-Office and Intra-Office mail.

It was decided to apply the concept of traveling salesman problem to optimize Inter-Office mail routes. The traveling salesman problem (TSP) asks the following question: "Given a list of cities and the distances between each pair of cities, what is the shortest possible route that visits each city and returns to the origin city?"

Traveling salesman problem is a non-deterministic polynomial-time hardness (also known as NP-hard) problem in combinatorial optimization, and often used in operations research and related problems.

New routes and schedules for the routes were developed for mail vans based on the solutions from the traveling salesman problem. In the revised schedules, the mail vans would have gone to most of the locations only twice a week, instead of going every day.

*Figure 4.4: Revised routes for inter-office mail for Company C*
Figure 4.4. on the preceding page demonstrates the revised routes that were proposed. However, this result was met with a lot of resistance from the union and even before the company could implement the routes, mail managers in two locations threatened that there may be strikes over this issue. As a result, Company C decided to not implement the solution.

Over a period of time, more data analysis was conducted on inter-office mail. Customer satisfaction survey was conducted focusing only on the inter-office mail. Figure 4.5 shows the results of the questionnaire in which 62 respondents participated.

Figure 4.5: VOC results for inter-office mail at Company C

The team also conducted ‘As-Is Process Map’ for inter-office mail. In this map, only 4% steps were considered value-added.
Figure 4.6: As-Is Process Map for inter-office mail at Company C headquarters

Last but not the least, the team also analyzed the data on outgoing inter-office mail from headquarters and identified 6 key locations. The average daily figures were minimal, as shown in figure 4.7 below.

<table>
<thead>
<tr>
<th>Top volume destinations</th>
<th>Avg. pcs. Per day</th>
<th>Percent of total volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Office A</td>
<td>14.61</td>
<td>24.8%</td>
</tr>
<tr>
<td>Office B</td>
<td>7.97</td>
<td>13.5%</td>
</tr>
<tr>
<td>Office C</td>
<td>4.25</td>
<td>7.2%</td>
</tr>
<tr>
<td>Office D</td>
<td>3.8</td>
<td>6.4%</td>
</tr>
<tr>
<td>Office E</td>
<td>1.92</td>
<td>3.2%</td>
</tr>
<tr>
<td>Office F</td>
<td>1.16</td>
<td>1.96%</td>
</tr>
</tbody>
</table>

Daily average – 59 pcs. Total

Figure 4.7: Inter-office mail volumes for high volume locations at Company C
The team proposed to Company C to completely stop the use of mail vans to deliver inter-office mail and replace the delivery with external carriers, such as FedEx and UPS. It was only accepted by the management after it was discovered that Company C had a pretty significant pre-existing discount with both FedEx and UPS for local routes and most importantly, a proposal was submitted to accommodate all the existing employees in mail department within the organization with other roles.

For Intra-Office mail, Company C was successful in allocating the mail runners to other job positions within Mail department, which were short-staffed. As a result, the Company was able to completely stop Intra-Office mail and employees were asked to deliver the mail to various floors themselves.

**4.8 Study 3: A new model of Mail**

Under the new model at Company C, the employees did not drop off pieces of mail on their floors and did not rely on the mail runners to pick and drop off mail within the same building. In other words, the intra-office mail has been stopped.

For Inter-office mail, the practice of using the mail vans to deliver inter-office mail was stopped for all purposes, except for 1 van that served the 6 locations once a week.

Management and leadership blamed the union environment for not able to completely stop the use of mail vans and use Fed Ex and UPS for inter-office mail. All the other employees were encouraged to use FedEx or UPS for Inter-Office mail.
CHAPTER 5

SUMMARY AND CONCLUSIONS

5.1 Overview of findings and Overall Conclusion

Out of the three organizations studied, senior management at Company A was most supportive. It was patient with results and provided the support and was willing to put all the efforts that were needed by the team right from developing the project charter all the way to brainstorming the solutions. The culture in Company A was positively moderating the likely outcomes of deploying Lean Six Sigma. It appears, that from the launch, the procurement project was part of a bigger thought out plan; it was a pilot for a lot of other projects that Company A would eventually do and more likely than not, the changes brought about in Company A would sustain.

Company A focused on instilling Lean Six Sigma as part of its culture, rather than focusing only on cost reduction or cost avoidance.

Further, due to the deployment of Lean Six Sigma, the leadership style of senior management was influenced and after the completion of the procurement project, they continued to train additional cohorts on yellow belt level. The Yellow Belts were given an opportunity to advance to Green Belt level.
Over a period of time, Company A introduced Lean Six Sigma White Belt training, a 4-hour online training. This training was made a part of the mandatory new-hire training module. Every new employee was made to go through it, regardless of their background. From physicians to nurses to lab assistants, everyone understood the value of process improvement. The training opened with a welcome message from the CEO of the organization.

Study 1 in our opinion supports both of our hypothesis:

**H1:** Lean Six Sigma deployment mediates Leadership style of the senior management and that in turn mediates the outcome of the projects and Lean Six Sigma deployment.

**H2:** Organizational Culture moderates the relationship between successful outcomes and deployment of Lean Six Sigma in an organization.

For study 2, in Company B, it seemed that Lean Six Sigma team was put together with a solution in mind and it was being used to validate a solution that certain leaders wanted to implement. However, in the way, the Lean Six Sigma team trained and deployed the methodology, Company B was able to avoid the unnecessary purchasing of the asset management software and not only saved money but also instilled Lean Six Sigma in its culture and the mindset of its employees, at least to some extent. The employees who had worked for years and had never thought about change management came to work with
new ideas. They had new hope and thought that their voices could be heard. The leadership was surprised and reacted positively. In our opinion, the deployment of Lean Six Sigma at Company B gave rise to a new culture.

This finding is aligned with the proposition we made at the beginning of the research:

“Lean Six Sigma deployment gives rise to a new Organizational Culture and effectively a new Leadership style: Lean Six Sigma Leadership”

Study 2 also supports both of our hypothesis:

H1: Lean Six Sigma deployment mediates Leadership style of the senior management and that in turn mediates the outcome of the projects and Lean Six Sigma deployment.

H2: Organizational Culture moderates the relationship between successful outcomes and deployment of Lean Six Sigma in an organization.

In Company C, unfortunately, the organizational culture was too overwhelming to achieve the desired results. Even though the company saved money by stopping Intra-Office and Inter-Office mail, it was not done in a way, where Lean Six Sigma could be seen as a value-added service to the organization. On the contrary, it was seen as a ‘flavor of the year’. In the follow-up conversations with the employees of Company C, most viewed it as a waste of their time and were not interested in becoming a part of the future
teams. Some shared their opinion that Lean Six Sigma consultants focus only on cutting jobs, rather improving processes. They were of the belief that in the following years, the senior management and the organization may be looking for deploying another set of tools.

Despite the clear data analysis and discounts available with FedEx and UPS, that indicated that it made sense to use FedEx and UPS instead of mail vans from a fiscal standpoint, the fact that company could not implement the solutions speaks volumes about the moderating effect of organizational culture on the outcomes of Lean Six Sigma deployment and supports our second hypothesis:

**H2:** Organizational Culture moderates the relationship between successful outcomes and deployment of Lean Six Sigma in an organization.

However, it is obvious that in this case in Study 3, we witnessed a negative interaction of organizational culture to the relationship between successful outcomes and deployment of Lean Six Sigma. If we compare Study 3 to Study 1, the results are extreme and poles apart.
5.2 Strengths of the research

This research provides a very interesting perspective on the relationship between Leadership, Organizational Culture, and Lean Six Sigma. While there have been numerous research done on these topics individually and also on Leadership and Organizational Culture, there is no evidence of a single study that focused on all 3. This study has tried to bridge the gap and introduce a very interesting topic for future research.

Further, this is one of the first research that studied the implementation of Lean Six Sigma while testing the certain hypothesis and bridged the gap between academia and practice and provided insights into the following areas:

- The culture of an organization plays a significant role in achieving successful outcomes while deploying Lean Six Sigma and positively interferes with outcomes and is central to the success of Lean Six Sigma deployment in an organization.
- Management support is key to success for deployment of Lean Six Sigma and achieving successful outcomes. Without the support of management, more likely than not, deployment of Lean Six Sigma cannot be prosperous.

From an applied research perspective, the emphasis that this research has laid on Leadership and Organizational Culture while deploying Lean Six Sigma would hopefully be very helpful for both practitioner and academic community.
5.3 Limitations of the research

There are several limitations of this research.

First, we conducted three different projects in three different organizations. It is quite possible that the outcome of the three projects would have been somewhat different in the same organization. The organizational culture of the business units within a company would have played a role.

We made an assumption that leadership style is based on the organizational culture. We did not consider the role or interaction that the person’s role, knowledge and experience play. We also did not consider the individual leadership traits in this research.

Further, we did not take into account the culture of the trade. For example, people who work in warehouses may have a certain set of culture within that trade. Similarly, mail operations may have a culture of its own as a trade. This may have biased our results to some extent and would be an interesting topic for future studies.

5.4 Future directions for similar research

For future, it would be a very interesting aspect to conduct the same study and implement the exact same project on different organizations, perhaps from standpoint of revenue, size of the organization, number of employees, number of locations etc. and analyze the outcomes. It would take away the biases we discussed in the limitations section above.
Additionally, it would be also very interesting to study the impact of the cost of lost opportunity by not deploying Lean Six Sigma in a timely fashion. For example, in Company A, due to all the support and positive interaction of organizational culture and leadership, Company A was able to reap benefits within a year and start working on other projects. The author has worked on some projects where it takes more than 2 years to see any positive return on investment.

It would be also remarkable to study the measurable impact of deployment of Lean Six Sigma. One such measure is variation in stock price. This can be somewhat challenging for organizations that are not publicly traded. Even for the ones that are publicly traded completely isolating other factors remains a challenge.

However, given the number high cost of poor quality that organizations are bearing recently, leadership, organizational culture, and Lean Six Sigma remain a topic that needs a lot of academic research.
Appendix-1: Survey questionnaire for Purchasing process for Company A

Open-Ended Questions:

1) What is your role in the organization?

2) For which areas are you responsible to submit a requisition?

3) How often do you submit a requisition? For which categories?

4) Are you familiar with your key account person in Purchasing, who manages your categories?

5) How many requisitions do you submit on a monthly or annual basis?

6) What is the average dollar value of the requisitions on a monthly or annual basis?

7) For what kind of services and/or goods, do you typically submit the requisitions?

8) Are these services and/or goods planned purchases?

9) Do you get an email when requisition has been assigned to a buyer in Purchasing department?

10) Do you get any notification when requisition has been converted to a Purchase Order?

11) Do you get regular communications from Purchasing Department on the status of your requirement?

12) Do you believe Purchasing department partners with your team?

13) Are you familiar with the vendors in the typical categories for which you submit the requisitions?
Appendix -1(cont.): Survey questionnaire for Purchasing process for Company A

14) Are you familiar with the typical time that it takes to purchase the materials and/or services in the typical categories for which you submit the requisitions?

Questions Used for calculating Index:

Provide a ranking for the following questions, using a 1 to 5 scale with the following description:

1- Strongly Dissatisfied
2- Dissatisfied
3- Neutral
4- Satisfied
5- Strongly Satisfied

1) Are you satisfied with the timeline (cycle time) associated with the processing of a requisition and the overall time it takes to procure the goods and/or services?

2) Are you satisfied with the efficiency of the Purchasing staff? (This question focuses on the distinction of time taken by Procurement vs the total time it takes to procure something)
Appendix -1(cont.): Survey questionnaire for Purchasing process for Company A

3) Are you satisfied with communication from the Purchasing staff?

4) Are you satisfied with helpfulness/courtesy of the Purchasing staff?

5) Are you satisfied with the knowledge/expertise of the Purchasing staff in the area/category of goods/services that you are intending to buy?

6) Are you satisfied with the value-add of the Purchasing department?

7) Are you satisfied with the process of submitting the requisition using ERP?

8) Are you satisfied with the available fields and the information required to submit the requisition?

9) Rate your overall satisfaction or dissatisfaction with the Purchasing process.
Appendix-2: SIPOC for Purchasing process for Company A

INTERNAL
- Stakeholders
- Purchasing Agents
- Supplier Management Group
- Tax
- IT
- Minority Women Business Enterprise
- Engineering
- SC Quality Assurance
- Risk Management
- Law
- Management
EXTERNAL
- Vendor
- Outside Counsel

REQUIRED
- Requisition
- Specs
- Supplier Qualification documents
- Supplier Enablement
- IT Approvals
- MWE documentation
- Insurance approvals
- Terms & Conditions
- Operating Procedures
- Legal and Management approval of contracts
- Quotes From Vendors
- Certificates of Insurance
- Supplier Scorecards for Professional Services

INTERNAL
- Stakeholders
- Procurement Specialists
- Law
- Management
- Supplier Management Group
- Accounts Payable

EXTERNAL
- Vendor
Appendix-3: As-Is Process Map for Purchasing process for Company A
Appendix-4: Survey questionnaire for facilities work order process for Company

**Open-Ended Questions:**

1) What is your role in the organization?
2) For which areas are you responsible to submit a Facilities Work Request?
3) How often do you have to initiate a Facilities Work Request? (on a monthly or annual basis)
4) What kind of issues make you submit a Work Request?
5) Do you have a key contact person in Facilities?
6) Are you familiar with the web portal to submit the Work Request? If so, about what percentage of the Requests that you submit are submitted using the portal?
7) What are the other mediums to submit the Request (in-person, over the phone, email etc.)? What are their approximate percentages?
8) Are you familiar with the Routine, non-Routine and other types of classification of Work Requests?
9) Do you get follow up from the Facilities on the Work Requests, after it is submitted?
10) Is there a follow up after the work is done?
11) Has your Work Request been rejected ever? If so, were you provided a reason? Was it a valid reason in your opinion?
12) Is there ever a request to fill a survey? If so, how often do you fill the survey? Has anyone contacted you about your comments post survey?
Appendix-4(cont.): Survey questionnaire for facilities work order process for Company

Questions Used for calculating Index:

Provide a ranking for the following questions, using a 1 to 5 scale with the following description:

1- Strongly Dissatisfied
2- Dissatisfied
3- Neutral
4- Satisfied
5- Strongly Satisfied

1) Are you satisfied with communication from the Facilities staff?
2) Are you satisfied with helpfulness/courtesy of the Facilities staff?
3) Are you satisfied with the successful resolution of the issues?
4) Are you satisfied with the timeline associated with the resolution of your issues?
5) Are you satisfied with the process of submitting a work request using the web portal?
6) Are you satisfied with the available fields and the information required to submit the Work Request?
7) Rate your overall satisfaction or dissatisfaction with the Facilities Work Request process.
Appendix-5: Survey questionnaire for mail process for Company C

Open-Ended Questions:

1) What is your role in the organization?
2) For which areas are you responsible to receive or send out mass mail (checks, customer mail etc.)?
3) How often do you have to send mail (checks, customer mail etc.)?
4) Where do you collect your incoming mail and where do you leave your outgoing mail?
5) Do you get an email when mail has been delivered to the building?
6) Do you use mail operations for inter-office and intra-office mail distribution?
   If so, how often?
7) Is there any kind of mail that cannot be sent electronically between the offices or using FedEx or UPS?
8) Are you familiar with the satellite trucks that we use to deliver the mail between these offices?
9) Do you use mail operations to receive or send personal mail or package that you can receive because no one is home while you are in office? Do you see value in the service provided by the company?
10) Do you see the overall value-add in the whole mail and delivery operations process?
Appendix-5 (cont.): Survey questionnaire for mail process for Company C

Questions Used for calculating Index:

Provide a ranking for the following questions, using a 1 to 5 scale with the following description:

1- Strongly Dissatisfied
2- Dissatisfied
3- Neutral
4- Satisfied
5- Strongly Satisfied

1) Are you satisfied with helpfulness/courtesy of the Mail Operations staff?
2) Are you satisfied with the efficiency of the Mail Operations staff?
3) Are you satisfied with the timeline associated with the processing of outgoing mail?
4) Are you satisfied with the timeline associated with the delivery of inter-office mail?
5) Are you satisfied with communication from the Mail Operations staff?
6) Are you satisfied with the process of sending and receiving mail (inter-office, intra-office and outside mail and packages)?
7) Rate your overall satisfaction or dissatisfaction with the Mail Distribution process.
Appendix-6: Airlines Category Strategy

## Category Profile & Core Team

### Description & Scope
- The Airlines Category includes airline fares, primarily for Corporate Travel. At this company, we capture airline travel in two main buckets: Meetings and Transient Air Travel.
- Our agreements with majority of airlines are North American Point of Sale (except for one agreement which is multinational POS) and have been historically extended to other affiliates.
- Most of the agreements are JV agreements. Airlines typically participate in alliances and globally there are 3 major alliances:
  - Star Alliance (United, Lufthansa, Air Canada, SAS etc.)
  - Sky Team (Delta, KLM)
  - One World (American)
- Stakeholders include anyone who travels on or on behalf of Company A (employees, consultants, guest speakers etc.)

### Category Cost Drivers
- Purchase Time Frame and Booking Method
- Agent vs. Online
- Primary cost drivers followed by Class of Service (Business vs. Economy).

### Industry Trends
- Continued consolidation of Airlines
- Upcoming merger of US & American
- Continued increases in ancillary fees.
- Increase in ticket change fees.
- Less willingness to negotiate with companies
- Airlines are looking for incremental market share volume (percentage of our total Air Travel) not necessary the total spend in terms of bb.

### Category Management Team

### 2013 Key Objectives
- Establish Category Strategy.
- Conduct and complete US POS RFP with major airlines.
- Document and explore policy changes and its impact with senior management.
- Recommend and implement process improvement initiatives to streamline the category.

### Implementation Status
- Strategy Under Development.
- Data being gathered for RFP.
- Benchmarking done with other pharma companies to gather best practices.

---

## North America Top Air Travel Destinations

- **Top 6 destinations**
  - New York City, Las Vegas, Los Angeles, Dallas, Philadelphia, and Orlando, have $11,027,744 in air spend and cover 43.40% of air spend
- **Top 20 destinations**
  - 72.55% of air spend

<table>
<thead>
<tr>
<th>Destination</th>
<th>Spend ($)</th>
<th>% of Spend</th>
<th>Cumulative %</th>
</tr>
</thead>
<tbody>
<tr>
<td>New York</td>
<td>3,101,660</td>
<td>12.21</td>
<td>12.21</td>
</tr>
<tr>
<td>Las Vegas, NV</td>
<td>2,640,207</td>
<td>9.68</td>
<td>21.89</td>
</tr>
<tr>
<td>Newark, NJ</td>
<td>1,706,772</td>
<td>6.72</td>
<td>28.60</td>
</tr>
<tr>
<td>Dallas, TX</td>
<td>1,473,144</td>
<td>5.80</td>
<td>34.40</td>
</tr>
<tr>
<td>Philadelphia, PA</td>
<td>1,258,936</td>
<td>4.95</td>
<td>39.34</td>
</tr>
<tr>
<td>Orlando, FL</td>
<td>1,027,022</td>
<td>4.04</td>
<td>43.40</td>
</tr>
<tr>
<td>Chicago, IL</td>
<td>892,061</td>
<td>3.52</td>
<td>46.92</td>
</tr>
<tr>
<td>Boston, MA</td>
<td>679,940</td>
<td>2.66</td>
<td>50.58</td>
</tr>
<tr>
<td>Phoenix, AZ</td>
<td>644,330</td>
<td>2.52</td>
<td>53.71</td>
</tr>
<tr>
<td>Atlanta, GA</td>
<td>570,997</td>
<td>2.23</td>
<td>56.19</td>
</tr>
<tr>
<td>Santa Ana, CA</td>
<td>569,699</td>
<td>2.24</td>
<td>58.19</td>
</tr>
<tr>
<td>Detroit, MI</td>
<td>567,337</td>
<td>2.23</td>
<td>60.43</td>
</tr>
<tr>
<td>New Orleans, LA</td>
<td>561,740</td>
<td>2.21</td>
<td>62.64</td>
</tr>
<tr>
<td>Washington, DC</td>
<td>463,565</td>
<td>1.82</td>
<td>64.46</td>
</tr>
<tr>
<td>Honolulu, HI</td>
<td>421,711</td>
<td>1.66</td>
<td>66.12</td>
</tr>
<tr>
<td>San Francisco, CA</td>
<td>386,025</td>
<td>1.52</td>
<td>67.64</td>
</tr>
<tr>
<td>Los Angeles, CA</td>
<td>367,623</td>
<td>1.45</td>
<td>69.09</td>
</tr>
<tr>
<td>San Diego, CA</td>
<td>356,443</td>
<td>1.31</td>
<td>70.39</td>
</tr>
<tr>
<td>London</td>
<td>293,279</td>
<td>1.15</td>
<td>71.45</td>
</tr>
<tr>
<td>Zurich</td>
<td>278,914</td>
<td>1.10</td>
<td>72.55</td>
</tr>
<tr>
<td>Others</td>
<td>6,976,355</td>
<td>27.45</td>
<td>100.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>24,411,418</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>
Appendix-6 (cont.): Airlines Category Strategy

Category Risk Map

<table>
<thead>
<tr>
<th>Leverage</th>
<th>Strategic</th>
</tr>
</thead>
<tbody>
<tr>
<td>High profit impact</td>
<td>High profit impact</td>
</tr>
<tr>
<td>Low supply risk</td>
<td>High supply risk</td>
</tr>
<tr>
<td>Medium level visibility</td>
<td>High sourcing difficulty</td>
</tr>
<tr>
<td>Focus on price competitiveness</td>
<td>Executive visibility</td>
</tr>
</tbody>
</table>

| Low profit impact        | Low profit impact                             |
| Low supply risk          | High supply risk                              |
| Low sourcing difficulty  | High sourcing difficulty                       |
| Low level visibility     |                                              |
| Transactional focus      |                                              |

Transactional Bottleneck

Substitutability/Risk

Category Risk Map... ‘Airlines’ is located between..

Leverage Strategic

Profit Impact Potential

Transactional Bottleneck

Substitutability/Risk
Appendix-6 (cont.): Airlines Category Strategy

Five Forces Analysis...

<table>
<thead>
<tr>
<th></th>
<th>L</th>
<th>X</th>
<th>M</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market Rivalry</td>
<td></td>
<td></td>
<td></td>
<td>H</td>
</tr>
<tr>
<td>Threat of Substitutes</td>
<td></td>
<td>X</td>
<td></td>
<td>H</td>
</tr>
<tr>
<td>Bargaining Power of Suppliers</td>
<td></td>
<td></td>
<td>X</td>
<td>H</td>
</tr>
<tr>
<td>Bargaining Power of Buyers</td>
<td></td>
<td>X</td>
<td></td>
<td>H</td>
</tr>
<tr>
<td>Threat of Market Entrants</td>
<td></td>
<td></td>
<td>X</td>
<td>H</td>
</tr>
<tr>
<td>Overall Opportunity</td>
<td></td>
<td>X</td>
<td></td>
<td>H</td>
</tr>
</tbody>
</table>

- Highly consolidating industry, however with high brand identity.
- Market share driven competition. Competitive edge based on hubs located in different geographies.
- Lots of mergers.
- High barriers to enter this industry. (Very high startup costs, Govt. regulations etc.)
- Limited number of suppliers in our market. E.g., SAS is the sole airline serving Newark to Copenhagen segment non-stop.
- Our limited opportunity to provide more market share.
- Lower bargaining power due to limited service providers.
- Lots of mergers.
- High barriers to enter this industry. (Very high startup costs, Govt. regulations etc.)

Air Travel can be seen as a cost that should be reduced or an enabler for continuous business growth

<table>
<thead>
<tr>
<th>Travel as a cost</th>
<th>Travel as a business enabler</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Characteristics</strong></td>
<td><strong>Characteristics</strong></td>
</tr>
<tr>
<td>Restricted carrier selection</td>
<td>High traveller flexibility</td>
</tr>
<tr>
<td>High focus on cost control and savings</td>
<td>Traveller empowerment in focus</td>
</tr>
<tr>
<td>Very limited traveller empowerment</td>
<td>Focus on service, comfort and travel efficiency</td>
</tr>
<tr>
<td>Limited competition in contract setup</td>
<td>High degree of competition on high volume city pairs</td>
</tr>
<tr>
<td><strong>Enablers</strong></td>
<td><strong>Enablers</strong></td>
</tr>
<tr>
<td>Strict global travel policy and focus on compliance and follow-up</td>
<td>Broad airline programme</td>
</tr>
<tr>
<td>Consolidate spend to a low number of selected carriers</td>
<td>Limited traveller restrictions</td>
</tr>
<tr>
<td>Restrictions on corporate travel activity</td>
<td>High contract coverage to optimise savings</td>
</tr>
<tr>
<td><strong>Savings</strong></td>
<td><strong>Savings</strong></td>
</tr>
<tr>
<td>High savings potential from leveraging spend with selected carriers and controlling traveller behaviour</td>
<td>Limited savings from leveraging spend without being able to control traveller behaviour</td>
</tr>
<tr>
<td>Savings potential: 15-25%</td>
<td>Reduced administrative resources required</td>
</tr>
</tbody>
</table>
Appendix-6 (cont.) : Airlines Category Strategy

Domestic Online Adoption Rate

- Average Agent Ticket Price: $547.22
- Average Online Ticket Price: $447.82
- Current Adoption Rate: 17% (including Meetings (39% for Transients))
- Potential Savings: $1.2 M (Assuming 50% adoption rate)

Advanced Booking Policy Impact:
Move 50% of domestic tickets purchased form 0-6 and 7-13 to 14-20 days

Potential Savings: $631,005
**Appendix-6 (cont.) : Airlines Category Strategy**

### Position: Maximize Strength/ Reduce Cost

**Overall strategy:** Maintain US FOS agreements with Airlines in the US and maintain or improve Company A’s discount structure by renegotiating with top 5-6 Airlines. In addition, increase cost-consciousness within Company A and explore policy changes along with process improvement initiatives to streamline the operations of Air travel.

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Tactic</th>
<th>Rationale / indicators of potential</th>
<th>Action required</th>
<th>Expected benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Best Price Evaluation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• <strong>Negotiate rates</strong></td>
<td>• Leverage competitive environment</td>
<td>• Conduct RFP</td>
<td>• Possible price reduction</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• <strong>Advance booking</strong></td>
<td>• Advance booking of ticket results in huge savings as compared to last minute booking. It would also be easier to plan meetings when the dates are booked in advance. In addition, if we can convert 25-30% of transient population to 14 days advance booking, we will save 100’s of thousands each year.</td>
<td>• Review Air Travel policy to mandate advance booking.</td>
<td>• Cost Savings.</td>
</tr>
<tr>
<td></td>
<td>• <strong>Online tool cost less to book a ticket.</strong> In addition, data shows us that average ticket price for online booking is $25 cheaper than booking through a travel agent. This tool (known as ‘Online Visual’ Helps to book directly)</td>
<td>• Review Air Travel policy to mandate usage of Online tool for booking tickets. Coordinate with Meetings Management group to sign them up for online tool.</td>
<td>• Efficient Process and Cost Savings.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• <strong>Use of Context</strong></td>
<td>• Discuss current capabilities of regions and explore how we can use it more effectively at Company A.</td>
<td>• Improve effective tool that will result in efficiencies and possible cost savings.</td>
<td></td>
</tr>
</tbody>
</table>

---

**Position: Maximize Strength/ Reduce Cost**

**Overall strategy:** Maintain US FOS agreements with Airlines in the US and maintain or improve organization discount structure by renegotiating with top 5-6 Airlines. In addition, increase cost-consciousness within organization and explore policy changes along with process improvement initiatives to streamline the operations of Air travel.

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Tactic</th>
<th>Rationale / indicators of potential</th>
<th>Action required</th>
<th>Expected benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Process Improvement Initiatives</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• <strong>Streamline operations related to Air Travel</strong></td>
<td>• Explore areas of opportunities in Air Travel that will help streamline the operations/transactional piece in the category.</td>
<td>• TBD</td>
<td>• TBD</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• <strong>RFP</strong></td>
<td>• For all international travel, there is a paper form that which release travel needs and have to be submitted manually before the user can book a ticket.</td>
<td>• Develop an electronic form and routing process that will eliminate the need for paper form</td>
<td>Efficient paperless process that will also allow for advance buying of ticket and possibly result in cost savings.</td>
</tr>
</tbody>
</table>
Appendix-7: Procurement Value Proposition Deck

Agenda

* Who is Company A Procurement...
* Company A Procurement 2017 Vision...
* What is Sourcing...
* The Sourcing Way at Company A...
* Summary and Next Steps...

Procurement 2017 Vision

Procurement will lead from the front by driving consistent, reliable and transparent processes, which deliver incremental value for Company A.

**Key “Procurement 2017” changes**

* Change the group’s identify: Purchasing → Procurement
* Shift from primarily an “operational control focus” to a “value generating focus”, taking a proactive role in spend management
  * Update policy to include “Early Procurement Notification” for significant, planned supplier engagement
* Shift from generalist alignment to Category Management combined with internal stakeholder management
* Consolidate and broaden key transaction support services
* Increase utilization of a standardized sourcing methodology across categories and the Company A organization
* Target and gear up for World-Class performance levels
Appendix-7 (cont.) : Procurement Value Proposition Deck

Strategic Sourcing defined...

- A systematic, team-based approach to leveraging the total global spend and developing a strong supply base. (Nelson, Moody, & Stenger, 2005)

- A detailed analysis of requirements, selection of suppliers, fact-based negotiation, & implementation of best-in-class contracts. (Pandit & Marmanis, 2008)

- The selection and management of suppliers with a focus on achieving the long term goals of a business. (ISM Glossary of Key Terms)

Some people think that Sourcing is all about cost reduction and that negotiation with suppliers is similar to a match of wrestling, but it isn’t. Careful analyses of spend patterns and market trends are applied to assure a fair and objective relationship with our suppliers

- Internal analysis of the spend structure and patterns
- External market analysis to understand the market trends
- Stakeholders analysis to understand our customers needs
- Balancing the price, quality, social-ethical, and environmental evaluation criteria
Appendix-7 (cont.) : Procurement Value Proposition Deck

In addition, Sourcing also focuses on ...

**Ensuring quality & innovation**
Superior quality and innovative ideas from our suppliers

**Reducing risk**
Well protected in case of a dispute/ breach of contract

**Optimising value for money**

Sourcing as a top priority...

**Reducing companies’ cost structures**

Looking ahead at the next 12 to 18 months, which, if any, of the following actions is your company considering to reduce costs?

<table>
<thead>
<tr>
<th>Action</th>
<th>% of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frontline labor reduction based on outs in volume</td>
<td>54</td>
</tr>
<tr>
<td>Nonlabor reduction through strategic sourcing/procurement effectiveness</td>
<td>44</td>
</tr>
<tr>
<td>Outsourcing or offshoring</td>
<td>38</td>
</tr>
<tr>
<td>Overhead labor reduction based on a program such as activity value analysis (AVA) or process redesign</td>
<td>30</td>
</tr>
<tr>
<td>Overhead labor reduction based on volume or a top-down percentage target</td>
<td>28</td>
</tr>
</tbody>
</table>

Appendix-7 (cont.) : Procurement Value Proposition Deck

Procurement Process → Sourcing

The Procurement Process & Expected Timeline

**Procurement Activity**
- Identify needs and initiate of sourcing project**
- Establish procurement project team, plan, governance and roles and responsibilities
- Describe needs, requirements, cost structure (bill of goods) and supplier selection criteria within
- Screen and shortlist potential suppliers (proven or accepted)

**Preparation**
- RFP submitted
- Analysis of proposals
- Analysis and review of supplier proposals
- Proposal presentations (meetings)
- Supplier evaluations, updated proposals and negotiations
- Supplier selection and feedback
- Contracting – preparation and execution
- Actual Project Initiation

**RFX Response**

- ~1-3 weeks

**Analysis & Negotiation**

- ~1-4 weeks

**Execution**

- ~0-2 weeks

**& ** Based on a specific need in Stakeholder group, which requires services and/or products from external suppliers
Who is then responsible for what?

**Procurement Activity**
- Identify need and initiate sourcing project*
- Establishment of sourcing project (scope, plan, governance and roles and responsibilities)
- Define needs, requirements, cost structures (bid grid) and supplier selection criteria in SOP
- Screen and short list potential suppliers (performed or accepted)
- RFP submitted
- Review of proposals
- Analyze and review of supplier proposals
- Supplier presentations (meetings)
- Supplier evaluation, updated proposal and negotiations
- Supplier selection and feedback
- Contracting – preparation and signing
- Actual project initiation

**Business Unit**

<table>
<thead>
<tr>
<th>Priority</th>
<th>Procurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>D</td>
<td>S</td>
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<tr>
<td>S</td>
<td>S</td>
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<td>S</td>
</tr>
<tr>
<td>D</td>
<td>D</td>
</tr>
</tbody>
</table>

* Based on a specific need in business unit, which requires services and/or products from external suppliers

**Procurement**

"Drives the procurement process and handles supplier interaction and negotiations"

**Business Unit**

"Defines and describes the needs, evaluates suppliers, selects and contracts with the selected supplier and initiates the project"

---

**Next steps... Let’s partner...**

- Develop a category strategy by aligning with your team.
- Conduct Spend Analysis to identify and prioritize the areas of opportunity and provide transparency on where the money is spent.
- Review the pipeline of future projects for 2013-2014 and identify areas where Sourcing can add value.


Case Studies Reviewed:


3. Casey, John J.: Reducing Delays Due to Inadequate or Incorrect Patient Preparation at Waterford Medical Associates – The “Dream Book”.


5. Devos, Denis J.: Improving e-Prescription Use by Patients.

6. DeFeo, Joe; Ralston, J. Er: Increasing the Percentage of Heart Failure Patients Who Receive Heart Failure Discharge Instruction.

7. DeFeo, Joe; Ralston, J. Er: Reducing the Time Female Patients Spend Waiting for Diagnostic Mammogram Results.

8. DeFeo, Joe; Ralston, J. Er: Reduction of the Incidence of Hospital-Acquired Pressure Ulcers – A Case Study from a Medium-Sized, Not-for-Profit Hospital.

9. DeFeo, Joe; Ralston, J. Er: Reduction in Length of Stay for Heart Failure & Shock Patients Admitted To A Medium-Sized Hospital.
10. DeFeo, Joe; Ralston, J. Er: Use of Process Improvement Tools and Concepts to Increase Aggregate Mean/Index Door-to-Balloon Time – In Acute Myocardial Infarction (AMI) Cases.


14. Helgeson-Britton, Pam: Improvement in Treatment Documentation at SMDC Rehabilitation Locations, Duluth, Minnesota, Region.

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