EMGT 835 FIELD PROJECT:
Office Supplies Cost Optimization using Six Sigma

By

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Master of Science

The University of Kansas

Spring Semester 2006

An EMGT Field Project report submitted to the Engineering Management Program and the Faculty of the Graduate School of The University of Kansas in partial fulfillment of the requirements for the degree of Master of Science.

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Table of Contents

List of Tables and Figures

List of Tables

List of Figures

Executive Summary

Six Sigma is quality management philosophy used by many successful companies. The DMAIC (Define-Measure-Analyze-Improve-Control) Methodology is a commonly used the Six Sigma tool designed to improve an existing process. V&P has chosen to use Six Sigma to reduce the cost of office supplies.

The office supply procedure is inconsistent as divisions purchase different products from different vendors resulting in unnecessarily high supply expenditures. These purchases fall into two categories: On-Contract and Off-Contract purchasing. Off-Contract purchasing has the greatest impact on high supply cost. Within Off-Contract purchasing, five trends was identified. Special requests and personal preference had the most significant impact.

Benefit calculations based on detailed breakdown of causes of variations combined with expert estimates provides expectations for improvements future purchasing transactions. Purchasing data was statistically analyzed to determine the process capability.
For the new process the process capability improved from 44 percent to 24 percent.

Cost will be lowered by expanding the list of On-contract supplies, negotiating additional on contract pricing, minimizing off-contract ordering, and reducing a other vendor ordering. The project is expected save approximately $120,000 in 2006.

Acknowledgements

Many people have contributed to my learning experience at The University of Kansas. I am thankful for my Field Project advisor, Professor Herbert Tuttle, for his insight, thought provoking questions and guidance for my Field Project. I have also benefited from the one of members of my Field Project committee member, Annette Tetmeyer, who provided an open door for questions and detailed suggestions that greatly improved my understanding of in-depth research. In addition, I would like to thank Dr. Robert P. Zerwekh. He has been very kind throughout my studied in The University of Kansas.

I would also like to thank other member, Parveen Mozaffar, for her support and help through out all the process.

Thanks to my best friend, Took, is for the weekly talks and guidance you shared from your heart and life experiences. Thanks to all my friends who have supported me. I would like to give the credit for my parents who have inspired me always and give me unconditional love and support me. I could not forget to thank my sister and brothers to assist me always. Much love and care for my baby who will be coming into the world soon. Finally, I am indebted to my husband, Vichian Kitchaiya, who provides a loving, caring, encouraging and supportive atmosphere that has allowed me to complete my Field Project in Engineering Management.

Introduction

V&P purchases for office supplies increased from last year nearly by 50 percent. In addition, there was a widely inconsistent cost per employees per division for office supplies. If the company can use Six Sigma tools, V&P could reduce spending level in each division and should have a saving of $120,000 in 2006 for office supplies.

The Company's History

V&P Technologies was formed in October 1991. The company has offered a comprehensive integrated set of both hardware and software tools for enterprise users. V&P is a medium sized firm with multiple operating divisions.

Today, V&P is a professional teamwork and Information Technology service organization. The company has 4 divisions employing 65 people and overseen by One Manager. The divisions are Finance Division, Pre-sale & Marketing, Sale Division, and Customer Support Division.

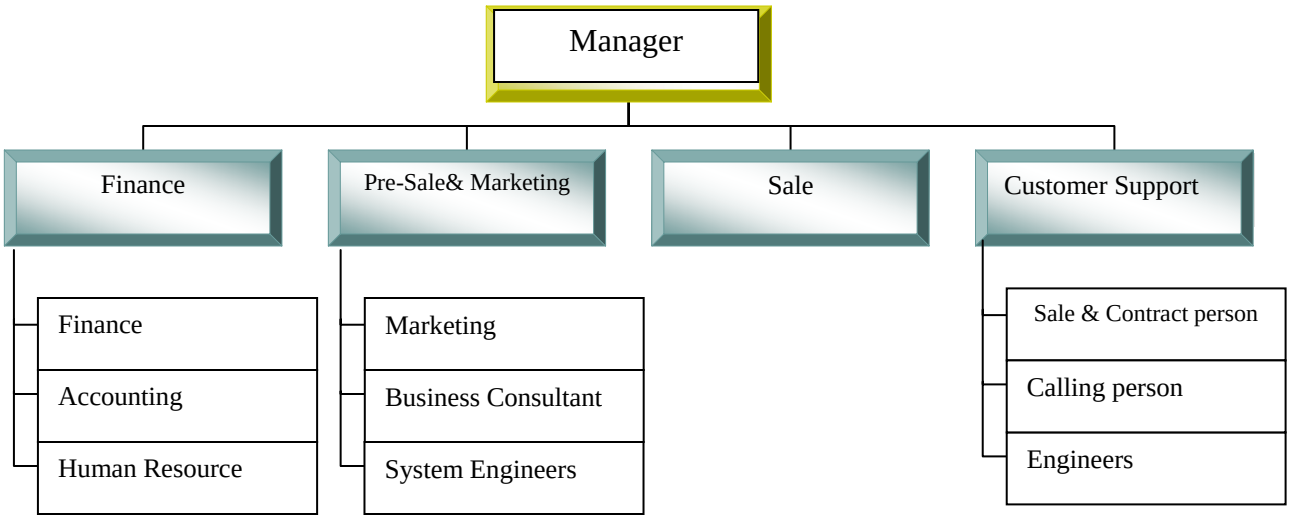


Figure 1: V&P Organizational Chart

Over the years, the company has established and maintained an excellent customer base. The company aims to be the leading provider of high-performance innovative products and services. Customers expect and receive a high level of support and professional services.

The company has always been committed to understanding the specific needs of customers and met these needs while still improving their energy savings and maintaining reduced costs. V&P values continuous improvement and while reducing operating costs.

Through this dedication, V&P has grown to become one of today's leading enterprise distributors for both hardware and software products. The company's success is based on its ability to understand the specific needs of users in the ever-changing field of computer and Information Technology.

Management philosophy for continued improvement

Every business exists to meet the needs of a customer, while making a return for investors. Being able to do so enables a company to stay in business and grow. V&P is committed to implementing continuous improvement efforts.

V&P has an admirable and successful history and has grown into a professional business. In order to retain or continue that status, it must continually improve; the vitality of the company depends on this.

In the past, change could occur relatively slowly. Companies could often survive or prosper by simply keeping their processes stable. Today's business world is demanding more responsive change management. Not only do processes have to be stable, but they also need to improve the ability to meet customer needs, or risk losing customers to competing businesses.

An area that has been identified for potential improvement and cost reduction is the purchasing of office supplies.

Office Supply Purchasing Process

The current process is inconsistent between divisions. Each division makes independent decisions regarding vendors and the supplies purchased from each vendor. At times, supplies are purchased to meet an immediate need from off-contract suppliers, resulting in higher costs. The result is unnecessarily high supply expenditures. This represents approximately a 20% increase in supply expenditures from 2004.

Off-Contract vs. On-Contract Purchasing

Current purchasing practices fall into two categories: Off-Contract and On-Contract. Off-Contract purchases are made through retailers such as Office Max. A disadvantage to Off-Contract purchases is that there is no ability to negotiate pricing or volume discounts. V&P does not have the ability to receive lower prices using Office Max.

On-contract purchases are made via Corporate Instruction. They provide buyers with a Quick Reference Guide containing approximately 200 office supply items. Buyers are able to view and purchase items using a web-based interface. Currently, a minimum order size of $100 is desired when purchasing items from Corporate Instruction.

Literature Review

What is Six Sigma?

The Six Sigma is a continuous change, bottom-line focused management methodology.

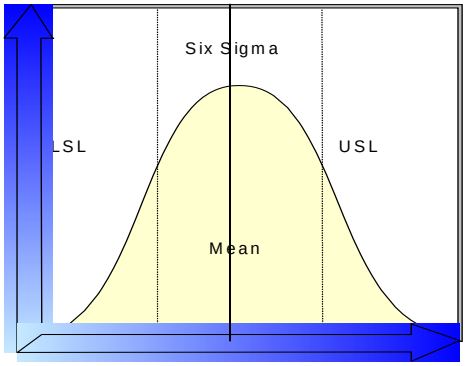
History of Six Sigma

Sigma is a Greek letter that was adopted in 1890 by Karl Pearson, an English statistician, as the symbol to represent a measure of how much something differs from a set standard. Standard deviation is a mathematical quantity that describes the variability of a response; it is the square root of variance. One standard deviation includes 68.27 percent of the data in a normal distribution bell curve.

In the Six Sigma methodology, process capability is a measure of the variance of a process output compared to the required limit. The "unit of measure" for the variance is a sigma. A higher sigma value or process capability means that there is less variation and fewer defects compared to the specified limit.

Process Capability

In a normally distributed process, plus or minus two sigma would indicate a 95 .44 percent defect free process. If a process capable of Six Sigma, six standard deviations can fit between the average output and the specification limit. A process with six sigma process capability will be 99.99966 percent free of defects. (Refer to Figure 2)



Lower Specification Limit (LSL)

Upper Specification Limit (USL)

Figure 2: Six Sigma Specification Limits

Customers will continue to change their demands and expectations for a product or service. Six Sigma accounts for the shift in customer expectations while maintaining acceptable defect limits. Six Sigma will provide for continuous improvement, but capabilities will have to be reevaluated based on new specification limits or customer needs.

"Even if you are on the right track, you will get run over if you just sit there."—Will Rogers

Design For Six Sigma by Greg Brue and Robert G. Launsby.

Publication: New York McGraw-Hill Professional, 2003.

"The concept of Six Sigma is to eliminate defects. Six Sigma is the goal, but it is less important that objective of pursuing continuing process improvement. Sometimes the Six Sigma implementation team needs to set more realistic goals, depending on customer requirements and expectations and the complexity of the product or service."

After completing a number of improvement projects, a company will be able to migrate towards better overall performance. Success breeds success. Once the methodology and terminology of Six Sigma are understood, a company will be better positioned to continually improve performance. They will have a greater ability to analyze problems precisely and to make performance improvements.

Six Sigma For Dummies by Craig Gygi, Neil Decarlo, and Bruce Williams.

Publication: Indianapolis, Indiana Wiley Publishing, 2005.

"Six Sigma is problem-solving methodology. In fact, it is the most effective problem-solving methodology available for improving business and organization performance. It is a methodology for minimizing mistakes and maximizing value. Every mistake an organization or person makes ultimately has a cost – a lost customer, the need to do a certain task over again, a part that has to be replaced, time or material wasted, efficiency lost, or productivity squandered. In fact, waste mistakes cost many organizations as much 20 to 30 percent of the revenue."

There are many reasons why Six Sigma could be a useful change management methodology for any company. Leading world-class companies recognize Six Sigma as a proven method for producing remarkable business results. The current market demands a renewed focus on client needs. Both the market and clients are changing, along with their needs. Six Sigma focuses on the Voice of the Customer (VOC). The customer can be an internal customer (such as employees) or external customers. Six Sigma improves communication among professionals, managers and clients by establishing a common language for process improvements. Productivity is enhanced to create value while reducing defects and cutting costs. Professionals are engaged in understanding and improving business processes. Six Sigma can help differentiate a company in the market. Client satisfaction will improve from a bottom-line focused on driven methodology. Six Sigma provides a common language for continuous improvement.

Demystifying Six Sigma by Alan Larson.

Publication: New York McGraw-Hill Professional, 2003.

"From its customer, Motorola learned that they needed to change their systems in all operations – manufacturing, service, administration, and sales – to focus on total customer satisfaction. From Japanese, they learned that including all of your employees in the company brain trust was an effective means of increasing efficiency and morale. From the Japanese, they also learned that simpler designs result in higher levels of quality and reliability. From early early-life field failure study they learned that they needed to improve manufacturing techniques to ensure that products were built right the first time.

Motorola's leader pulled this together to establish the vision and set framework for Six Sigma. Posters were hung up, and small cards were given to all employees (Refer to Figure 3).

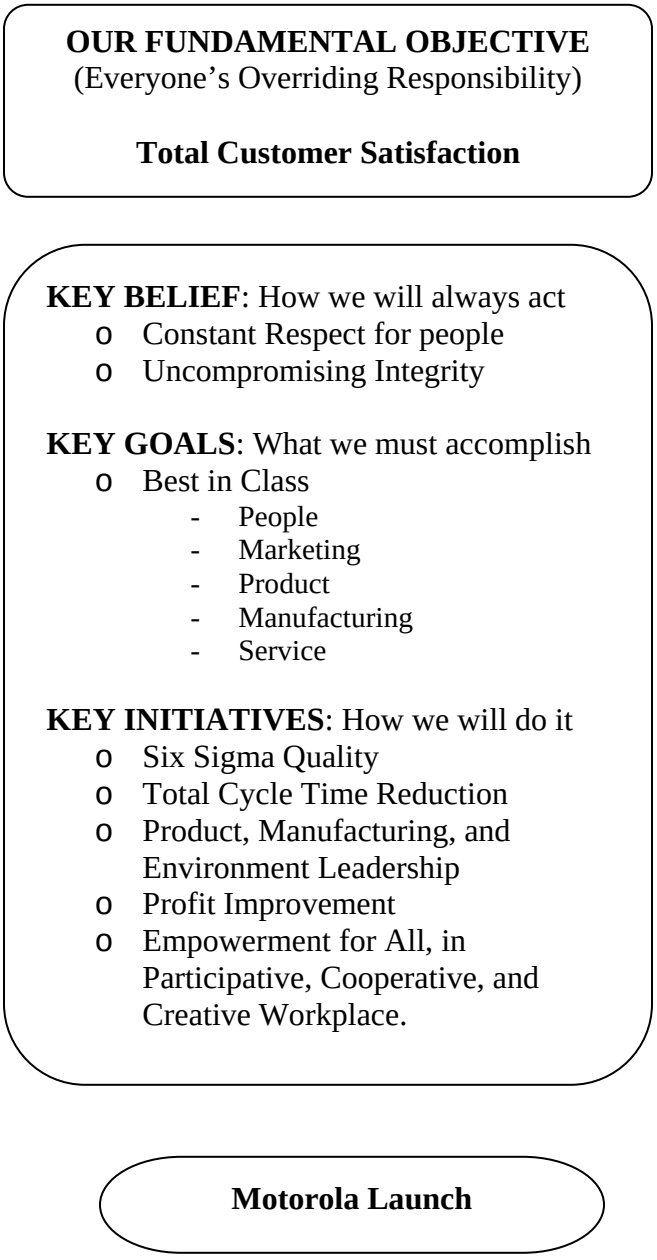


Figure 3 : Motorola Launch

Thus, Six Sigma launched in 1987. The corporate leaders toured the world to all Motorola sites to explain that this new initiative is going to be operating mantra of Motorola for future."

After Motorola's launch, Six Sigma initiatives were adopted by other companies. (Refer to Table 1)

1988	Malcolm Baldridge National Quality Award to Motorola
1990	Motorola's Six sigma Research Institute Participants: IBM, TI, Digital, ABB, Kodak save $2.2
1994	Six Sigma Academy founded : Allied Signal/Honeywell and GE
1995	GE launches Six Sigma effort
1997	Six Sigma delivered savings of $320 to GE
Until now	Many other companies adopting Six Sigma methodologies

Table 1: Six Sigma Timeline

Motorola was joined by AlliedSignal, IBM, Honeywell and others, who also achieved great success using Six Sigma. Within four years, Six Sigma had saved these few companies over $2 billion.

Probably the mostly widely recognized success was achieved by GE in the late 1990s. Although GE was not in the initial group of the first six participants, it managed to achieve truly astounding success with Six Sigma. GE asserts that Six Sigma is changing the way it does everything.

They could find an approach to achieve and maximize business success (not just quality for the sake of quality), applicable to all functional areas (not limited to any function or business), a data-driven systematic approach to process improvement (not gut judgments), and structured approach with sophisticated tool kit using powerful statistical methods.

Some Six Sigma Success Stories

The Six Sigma Way: How GE, Molorola, and other Top Companies are Honing their performance by Peter S. Pande, Robert P. Neuman, and Roland R Cavanagh. Publication: New York McGraw-Hill Professional, 2000.

"General Electric (GE)

Six Sigma has forever changed GE. Everyone-from the Six Sigma zealots from their Black Belt tours, to the engineers, the auditors, and the scientists, to the senior leadership that will take this company into the new millennium—is a true believer in Six Sigma, the way this company now works.—GE Chairman John F, Welch, 1995.

At GE, the passion and drive to adopt Six Sigma have produced some very positive results. The hard numbers behind GE's Six Sigma initiative tells just part of the story. From the initial year efforts, the payoff has accelerated: $750 million by the end of 1998, a forecasted $1.5 billion by the end of 1999, and expectation of more billions down the road. GE improved everything from service to manufacturing. The financial big picture is just a reflection of the many individual successes GE has achieved through its Six

Sigma initiative. For example, the Medical Systems Business (GEMS) used Six Sigma design techniques to create a breakthrough in medical scanning technology. Patients can now get a full-body scan in half a minute, versus three minutes or more with previous technology. Hospitals can increase their usage of the equipment and achieve a lower cost per scan.

The action behind the results of GE's success is that ten of thousands of GE managers and associates have been trained in Six Sigma methods – a hefty investment in time and money (which is appropriately deducted from the gains cited earlier). The training has gone well beyond "Black Belts" and teams to include every manager and professional at GE – and many front-line people as well. While dollars and statistical tools seem to get the most publicity, the emphasis on customers is probably the most remarkable element of Six Sigma at GE. As Jack Welch explains it:

The best Six Sigma projects begin not inside the business but outside it, focused on answering the question—how can we make the customer more competitive? What is critical to the customer's success? One thing we have discovered with certainty is that anything we do that makes the customer more successful inevitably results in a financial return for us."

The Six Sigma Methodology

There are many, many tools that are included in the methodology commonly referred to as Six Sigma. There is also more than one methodology included in Six Sigma, though the most commonly used methodology is DMAIC. It is a Six Sigma methodology for improvement of an existing process. The other methodology, which is used much less frequently and is intended for the development of an entirely new process or product, is called DFSS (Designed for Six Sigma). By default, when someone refers to Six Sigma methodology, you can conclude it is the DMAIC process.

Today, Six Sigma has become widely recognized as an effective, proven method for improving performance in many businesses.

The Six Sigma Project Planner by Thomas Pyzdek

Publication: New York, London McGraw-Hill Professional, 2003.

The Five Phases of DMAIC method are:

Define: To define the project's purpose and scope and collect background information on the process and your customers' needs and requirements.

Measure: To gather information on the current situation to provide a clearer focus for your improvement effort.

Analyze: To identify the root causes of defect and confirm with data.

Improve: To develop a solution, use data to evaluate the results and create a plan to carry out the solution.

Control: To maintain the gain that company has achieved by standardizing methods and anticipating future improvements, making additional plans to preserve the lessons learned from the improvement effort.

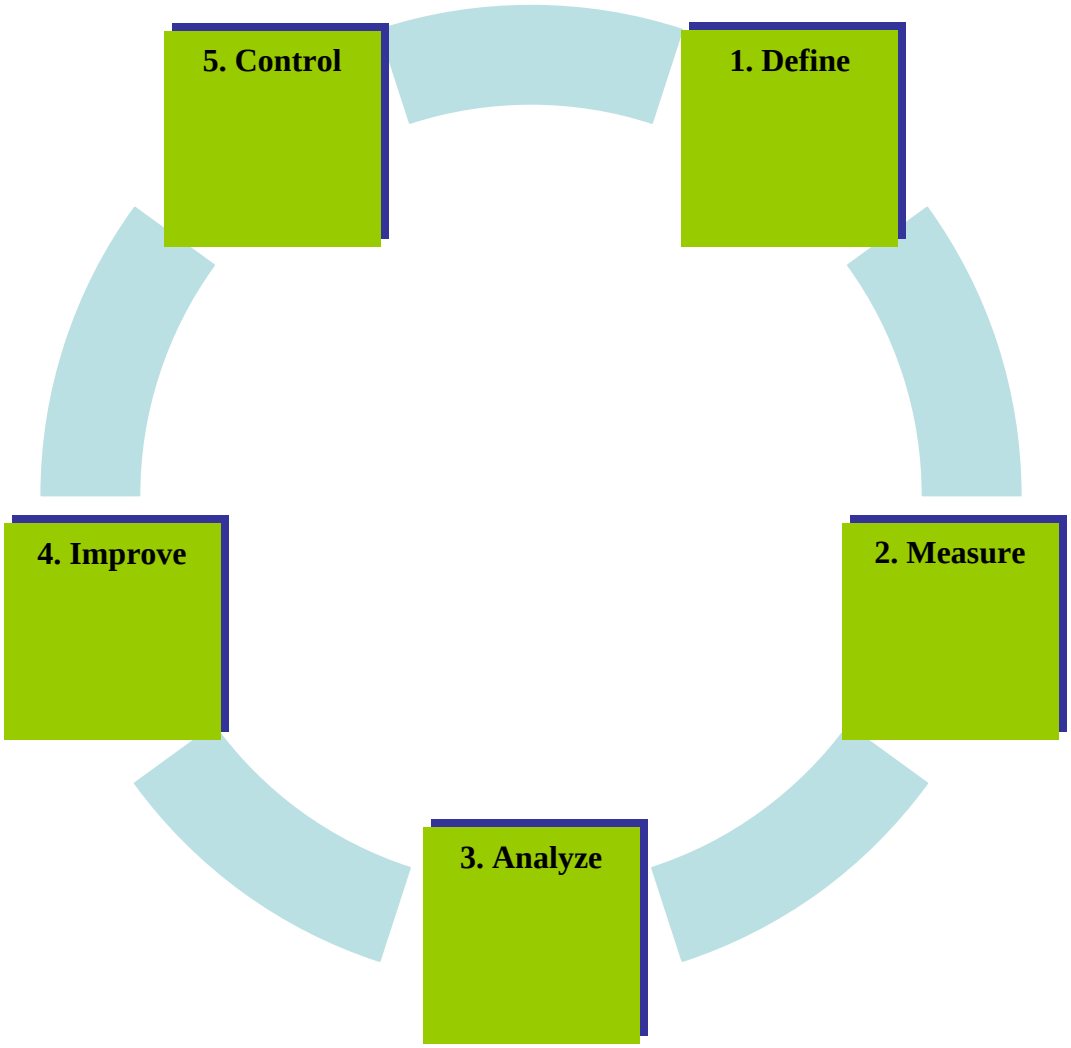


Figure 4 : The Five Phases of DMAIC Method

What does the DMAIC methodology really do?

The methodology applies a logical plan to combine statistical analysis with process knowledge. The method involves defining the issue or practical problem, converting that practical problem into a statistical problem, solving the statistical problem, and converting that solution into a practical solution. The results are very powerful.

DMAIC is a bottom-line, data driven methodology that is more focused on incorporating statistical analysis to improve quality to create value.

How will V&P benefit from Six Sigma?

The benefits of Six Sigma are having a measurable way to track performance improvement, focusing the attention on process management at all organizational levels, improving customer relationships by addressing defects, improving efficiency and effectiveness of processes by aligning them with the customer's needs.

The DMAIC method includes five phases of improving any existing process – Define, Measure, Analyze, Improve, and Control. These phases are virtually the same in any company that has adopted what is now known as Six Sigma. The individual steps within each phase may vary slightly from one company's implementation to another; such variance is usually minor and almost inconsequential. The five phases presented in this document are a standard that will be used for every DMAIC project. It is very important that five phases be consistently followed to achieve anticipated results and keep the benefit at the appropriate level for the company.

Six Sigma will help V&P focus on internal and external customer's needs and will improve the processes that meet those needs, with an eye for value creation. Specifically, the DMAIC process will help to reduce the Office Supplier Cost for V&P and generate saving for the future.

Optimization using the DMAIC Process

V&P believes it can reduce the office supplies cost by optimizing the purchasing process using Six Sigma methodologies. Office supplies are consumables used for executing daily work such as pens, tape, and paper, but exclude permanent office items such as furniture, appliances, etc. Office supplies also include technical supplies consisting mainly of consumable IT supplies, such as printer cartridges, ink cartridges, CD and DVD discs, mouse pads, etc.

In the Six Sigma, a commonly used tool is the DMAIC methodology. The DMAIC method includes five phases of improving any existing process – Define, Measure, Analyze, Improve, and Control.

DEFINE PHASE

The goals of the define phase are to:

1. Define the project purpose and scope
2. Collect background information on the process
3. Conduct a Voice of the Customer (VOC) analysis

Define the project and scope

In the define phase, determine the business objective of the project scope and resources needed to complete the project. Developing a team charter will help to summarize the purpose and project scope.

A team Charter is a summary document that describes the purpose and scope of Six Sigma. It focuses on the activities of the team and communication with other in the team. It will help the team to understand what the project proposes to accomplish.

The key component of a team charter is project scope, process scope, problem statement, goal statement, project risks, and benefits.

Project Scope

The project scope will include all office and technical supplies. Office supplies are consumables used for executing daily work. Permanent office items such as furniture and appliances are excluded. Technical supplies consist mainly of consumable Information Technology (IT) supplies such as printer cartridges, CD/ DVD discs, and mouse pads.

Process Scope

The process scope is a list of team values. These values make a significant contribution to V&P's success and are all equally valued. Honesty, doing quality work, fulfilling customer needs, and achieving personal goals are all team values.

Problem Statement

The problem statement is that the office supplies procurement process is inconsistent between divisions. Different products can be purchased from different vendors. There are variations in the cost of office supply products purchased. There are significant variations in the office supply cost per employee per division.

Goal Statement

The goal statement is to improve and has the result in saving of 20% ($120,000) of the current amount using the optimized process.

Project Risks and benefits

The project risks are data availability and data accuracy. There are both hard and soft benefits for this project. The hard benefits are potential reduction in overhead costs of $120,000 or more. The soft Benefits are set user expectations, set policy, and set procedures.

Collect background information on the process

To better understand the current process, high-level process maps will be created. The following is a list of the process maps:

1. Purchasing from Office Max (any items)
2. Purchasing from Office Max (Off-Contract)
3. Ancillary Process Maps have Receipt & Distribution of Product, Handling Partials & Back Orders, and Handling Returns such as miss-picks or wrong product orders (by V&P)
    a. Receipt & Distribution of Product
    b. Handling Partials & Back Orders
    c. Handling Returns

The process maps are arranged from top to bottom to provide a general of idea the entire purchasing process. The outputs of the processes are quality, availability, accessibility, value, and perception of need fulfillment.

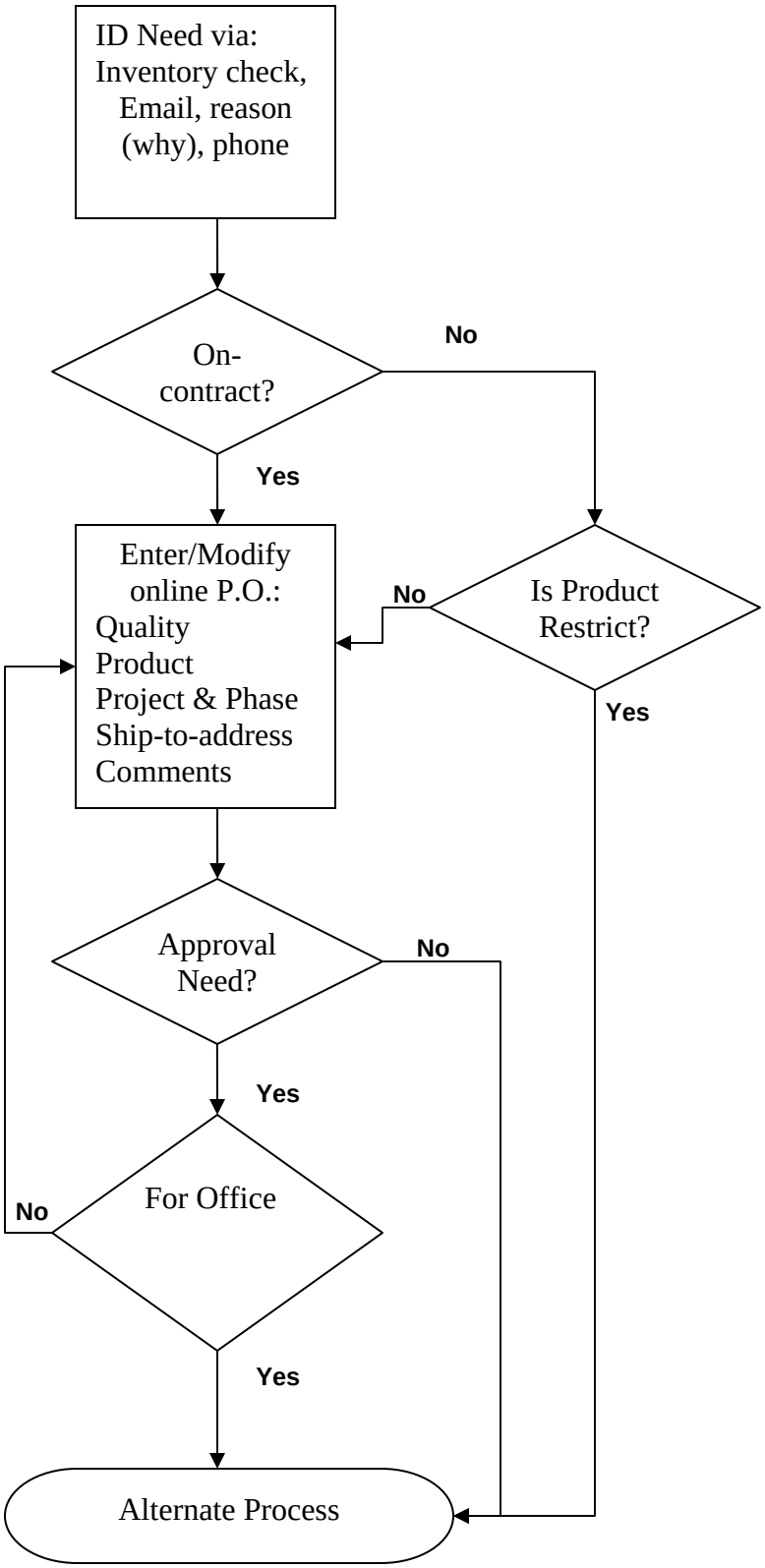


Figure 5 : Purchasing from Office Max (any items)

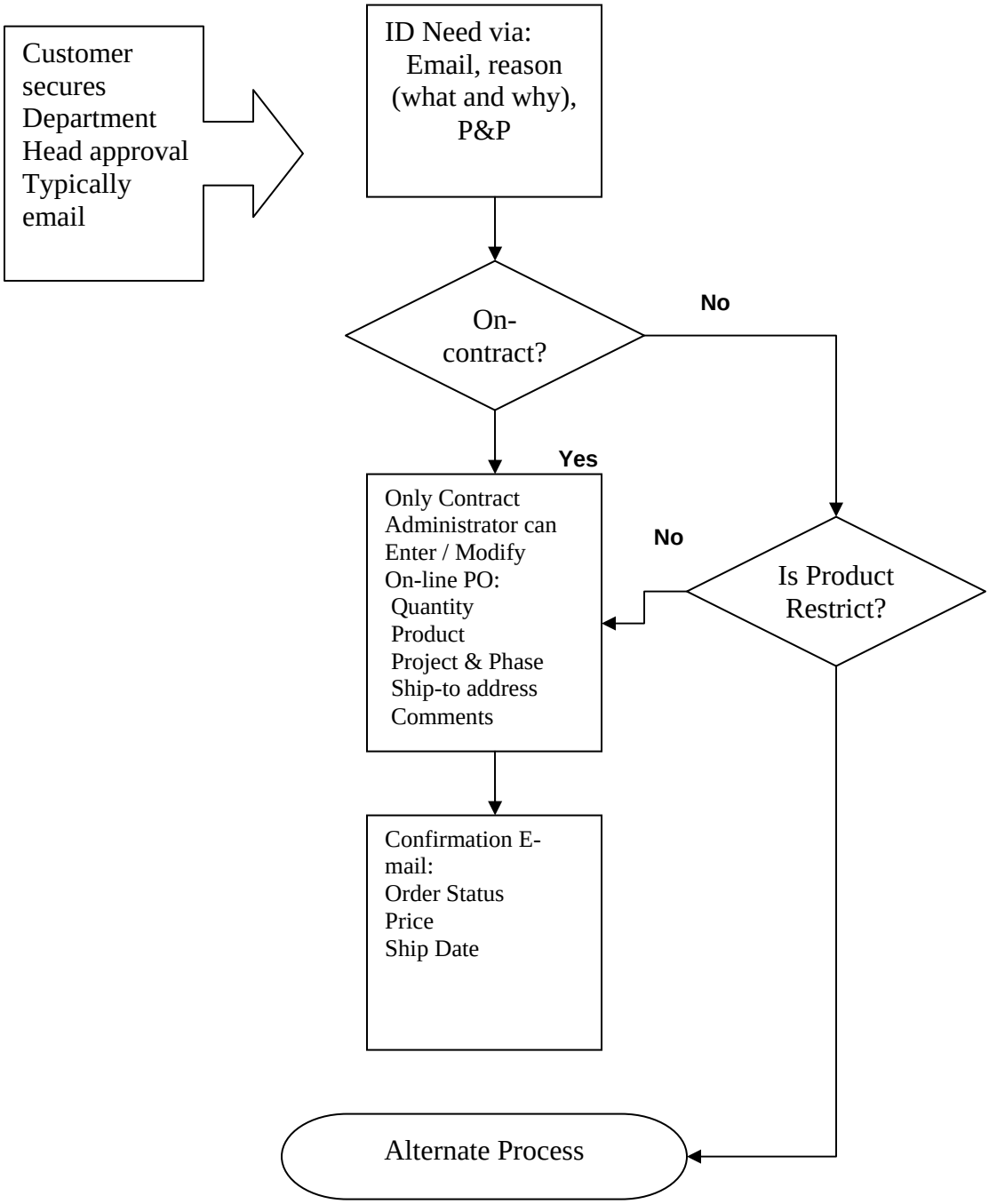


Figure 6 : Purchasing from Office Max (Off-Contract)

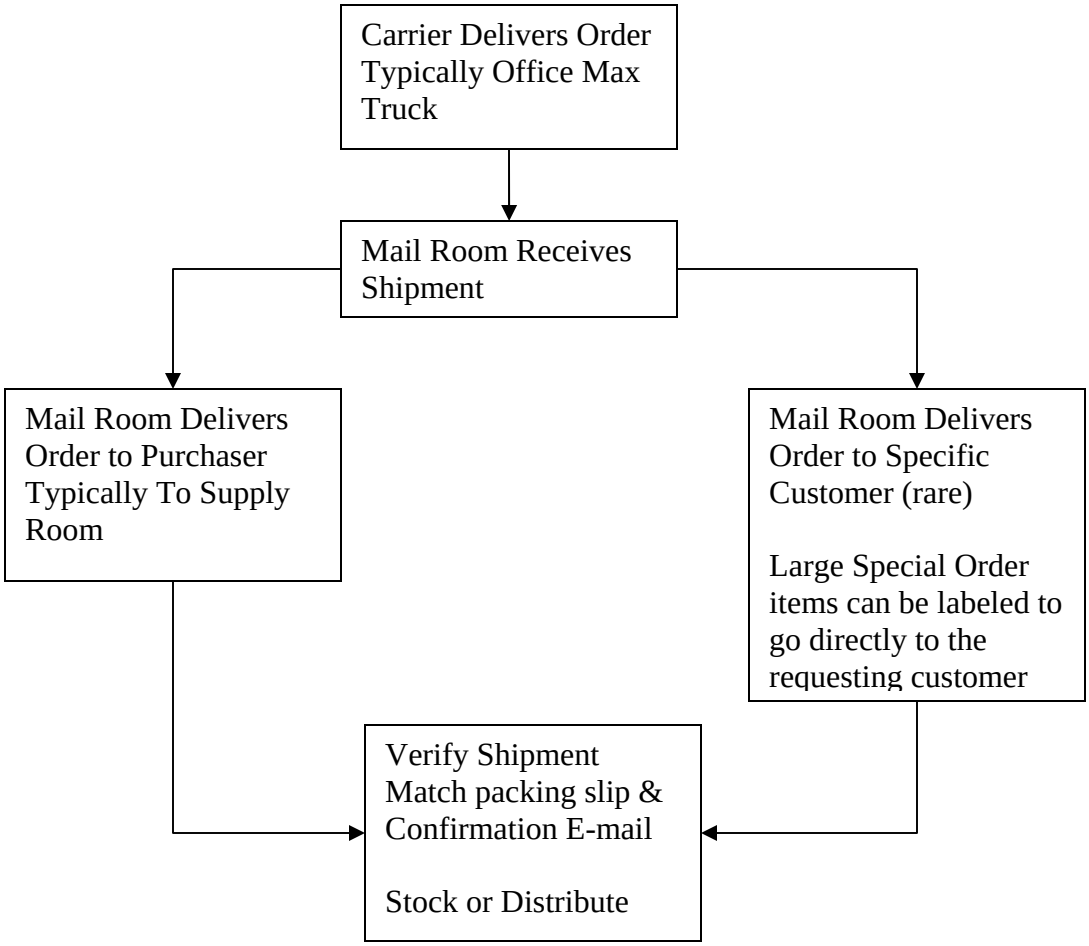


Figure 7 : Receipt & Distribution of Product

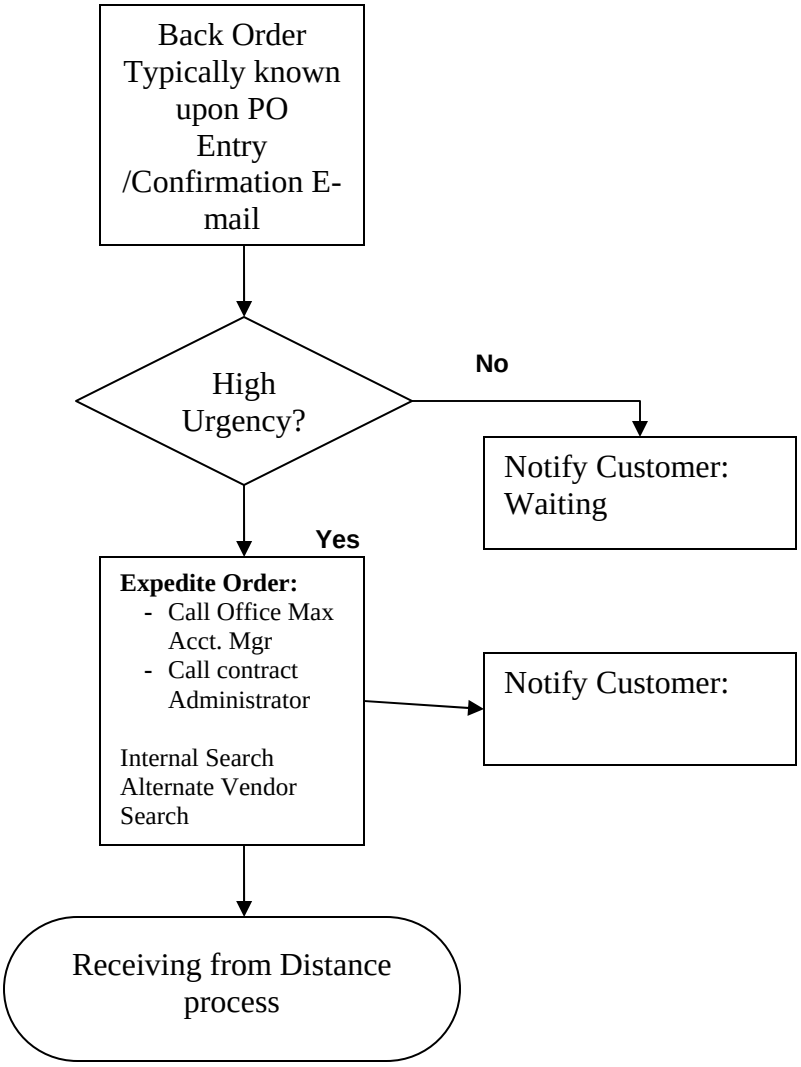


Figure 8 : Handling Partials & Back Orders

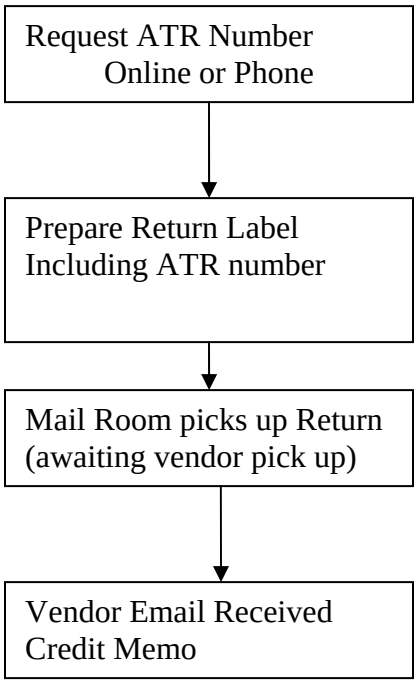


Figure 9 : Handling Returns

Conduct a Voice of the Customer (VOC) analysis

This step will find out customer needs and identify the process and products to be improved. Determining Critical to Quality requirements (CTQ's) begins with identifying customers through a stakeholder analysis. In this project, the employees are the customers.

Identify Customer and Project CTQ's (Critical to Quality characteristic) by focusing outward on the customer CTQ is the initial step in Six Sigma. Value is in the eye of customer. Listening to the customer and designing CTQ in the processes and help to eliminate of costly fixes and rework.

The customers in this project are any user of office supplies or those involved in the purchasing process. Customers can be a person or a group such as users of office supplies, supply coordinators, order approvers, administration, and mail room. The users know what they use and do not use in the office. During data collection, customers provided input into their office supply needs.

Each customer is very important in the project. However, customers have different levels of influence over the purchasing process. For example, purchasing agents have different priorities than basic users.

In the Six Sigma methodology, it is easy to get caught up in follows the rules and using the quality tools correctly. The tools can be standard aids in any type of problem solving.

The office supplies project used the CTQ Drill-Down Tree to determine what CTQ's should be included in the project scope. The CTQ Drill-Down Tree helps define and identify the customer's requirements. The tool breaks down vague customer CTQ into specific requirements.

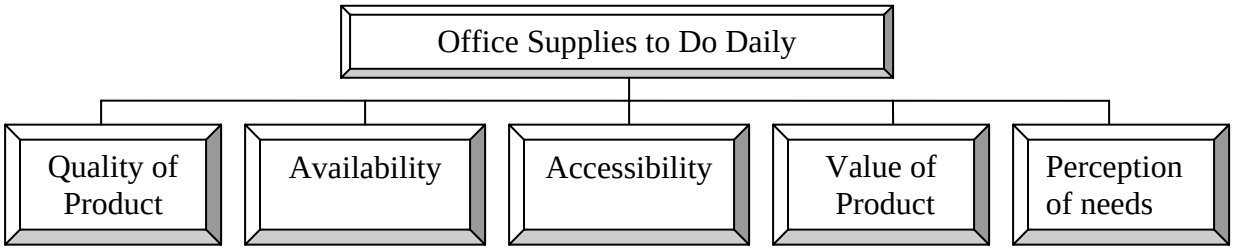


Figure 10 : CTQ Drill-Down Tree for the process output and the supplies process

The CTQ’s will be expanded during the measure phase.

Project Goal

The goal of the Office Supplies Cost Reduction Project is to determine the correct procedure for ordering office supplies to achieve the lowest cost for the upcoming year.

MEASURE PHASE

The goals of the measure phase are to:

1. To build a factual understanding of existing conditions by focusing the project on a specific, measurable CTQ’s
2. Validating the planned measurement system
3. Collecting necessary data

CTQ details

Figure 11 shows additional characteristics for CTQ’s determined in the define phase.

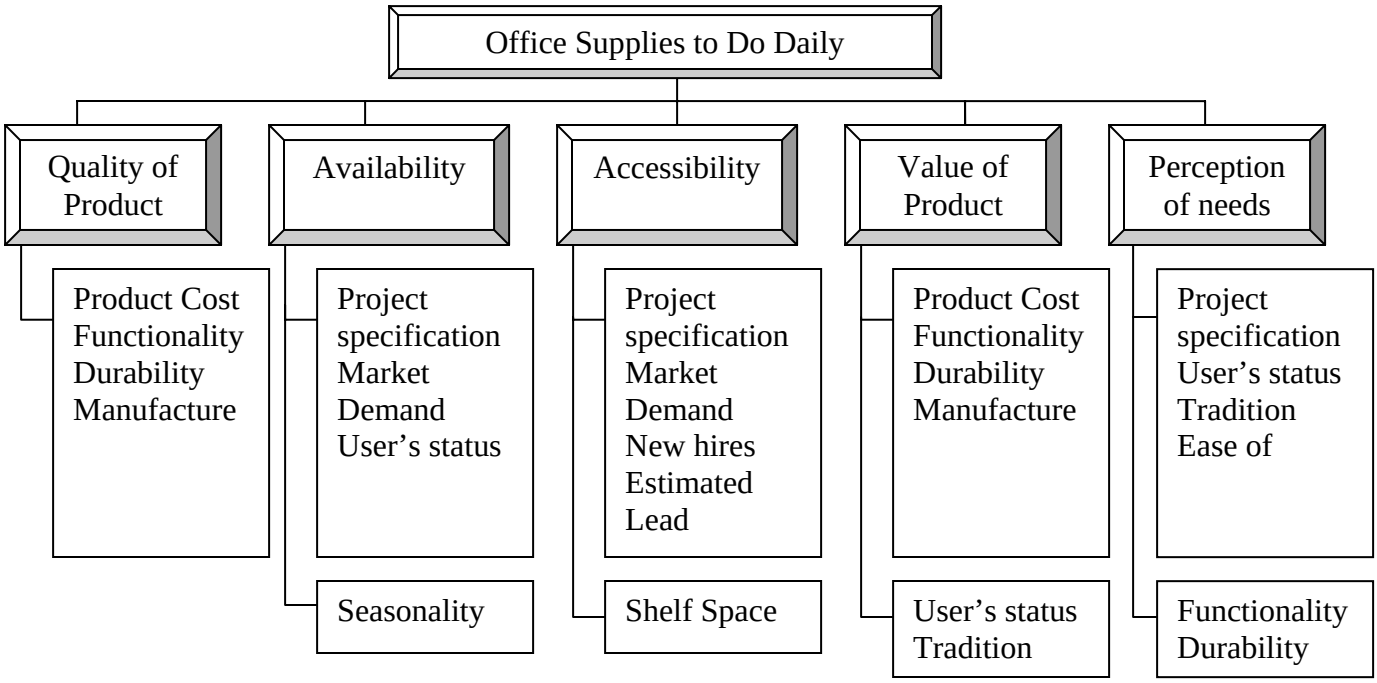


Figure 11 : Expanded CTQ's

Validating the planned measurement system

Measurement system error is not concern for this project. Analysis is based on historical data for the calendar year 2005. Data Sources are Financials General Ledger for all office supply transactions. Therefore, the measurement system is valid.

Collecting necessary data

Data was collected for on-contract and off-contract office supply purchases for 2005. This includes:

- On-contract and off-contract purchases
- Retail off-contract purchases
- Other vendor purchases

ANALYZE PHASE

The goals of the analyze phase are to:

1. Pinpoint the location or source of problems as precisely as possible by establishing the current process capability
2. Identify the objective for the process and determine the variation sources of the stated problem.

Establish Process Capability

Table 2 and Figure 12 show the main categories office supply items and the breakdown between on-contract and off-contract purchases.

Category	MAJOR CATEGORIES		
	On-Contract	Off-Contract	Total
Folders	38,509	1,695	40,204
Binders	21,955	9,587	31,542
Paper	48,279	12,930	61,209
Pens	19,044	14,365	33,409
Ink	32,783	18,392	51,175
Discs	15,938	9,055	24,993
Others *	75,905	55,361	131,266
TOTALS	252,413	121,385	373,798

Table 2 : Major Purchasing Categories

* Others include drinking water, coffee, batteries, calendars, planners, Post-its, Note pads, and so on.

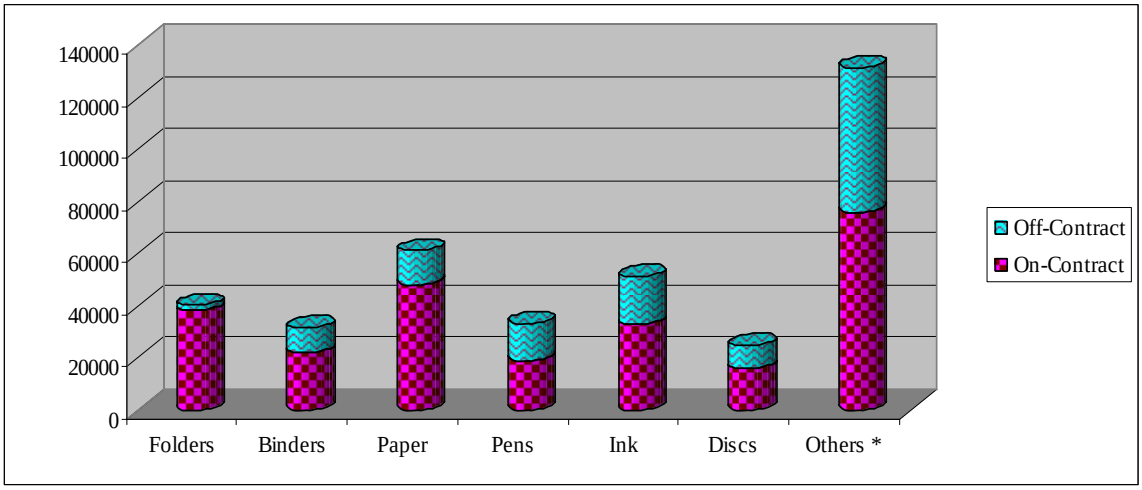


Figure 12 : Major Purchasing Categories

Table 3 and figure 13 show the vendor breakdown for office and technology supplies both on-contract and off-contract.

Vendor	Office	Tech	Office & Tech
OfficeMax On-contract	192,297	60,116	252,413
OfficeMax Off-contract	95,645	25,713	121,358
OfficeMax Retail	11,064	0	11,064
Other Vendors	99,264	16,917	116,181
Total	**318,270**	**102,746**	**501,016**

Table 3: Vendor Breakdown

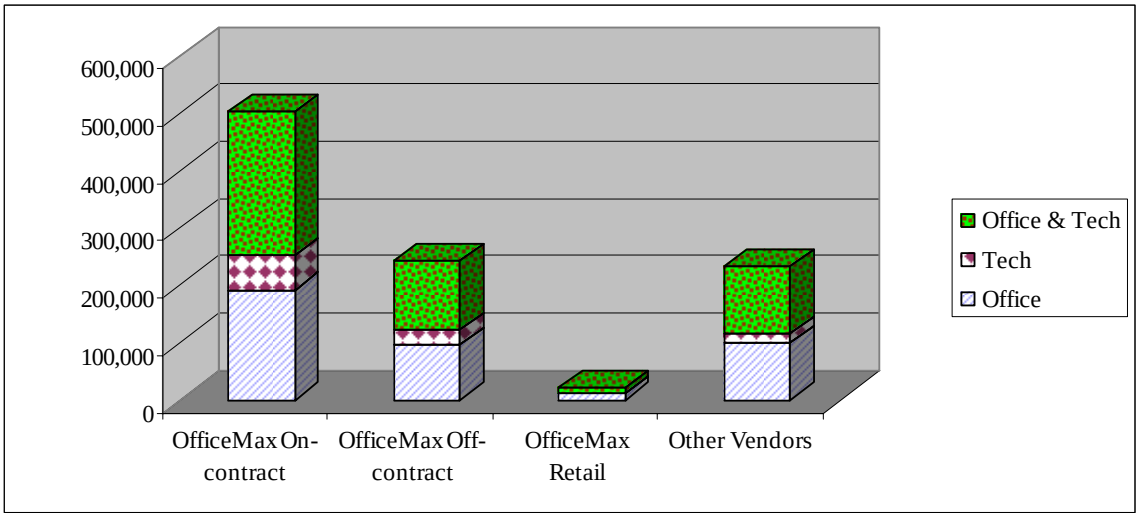


Figure 13 : Vendor Breakdown

In terms of the improved process capability, the new process capability will be calculated. There is an important distinction between what is the termed the long-term process capability (**Z_{LT}**) and the short-term process capability (**Z_{ST}**). Generally, the long-term process capability can be determined by using existing statistical analysis that has already established the average shift in the process capability. The Z shift is commonly assumed to be 1.5 sigma ($Z_{ST} = Z_{LT} + 1.5$). The 1.5 sigma can be attributed to the influence of random error in the process. Since all processes exhibit variation, it is important to understand the process capability in order to meet the customer needs.

Process Baseline	Total of Number Defects D	Total of Number Units U	Total Defect % D/ (U^OP)	DPMO DPMO	Long Term Capability Z_{LT}	Z shift	Short Term Capability Z_{ST}
Office Max Purchases	125,895	384,835	33%	330,000	0.44	1.5	1.94
Other Vendor Purchases	92,945	116,181	80%	800,000	-0.83	1.5	0.67
Total	218,840	501,016	44%	1,130,000	0.15	1.5	1.65

Table 4 : Process Capability

Sources of Variation

V&P wants to find out why the company purchases from Off-Contract and Other Vendors. Customers were surveyed to determine possible reasons impact and results for off-contract purchases. (Refer to Table 5)

Reason for Non-Contract Purchase	Impact	Resulting in:
Project Dept Request	Large	Other Vendor or Off-Contract
Personal preference item	Large	Other Vendor or Off-Contract
Office Max out-of-stock	Medium	Other Vendor
Item less costly from other vendor	Medium	Other vendor
Item was needed immediately	Medium	Other vendor or Off-Contract

Table 5 : Customer Survey Data

The survey of buyers is used to collect quantifiable data on the reasons purchases are made Off-Contract (from Office Max). Twenty-third office supply Buyers were surveyed who had the highest expenditures. Each buyer analyzed the 20-30 most recent purchases (highest cost & volume line items), five possible responses were provided (reasons for off-contract buy). Data was broken down into eight supply categories (Refer to Figure 14).

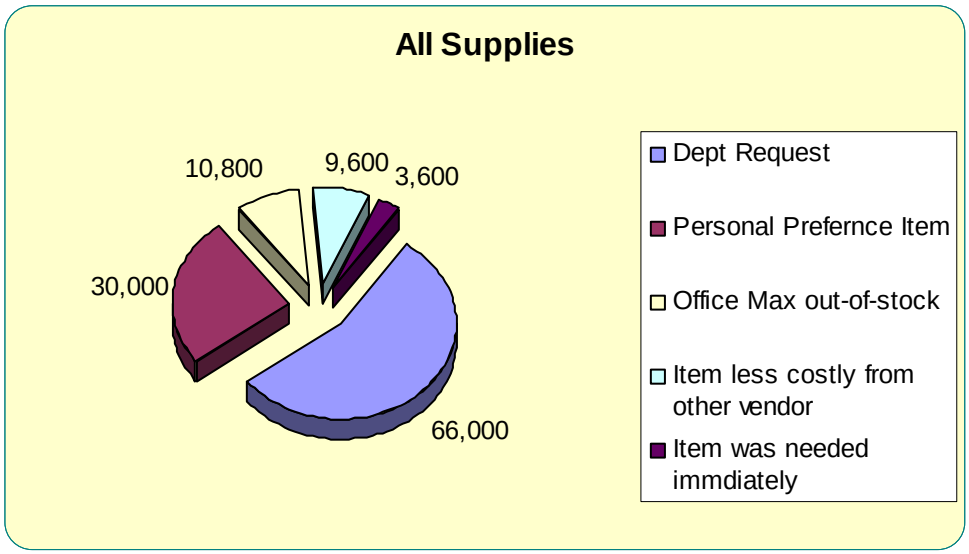


Figure 14 : Pareto analysis applied to "All Supplies" category

Relationship among the Xs and the CTQ's

In looking at the buyer survey data, it appears that items purchased for special projects or department requests have the highest impact on the CTQ's.

IMPROVE PHASE

During the analyze phase, the current capability of process was determined and the sources of variation or root causes of defects are identified.

The improve phase will statistically verify the vital few Xs that cause the variation in Y, determine the settings that eliminate the Y variation, and then statistically validate the new process operating conditions.

The efficient improvement of any process requires knowledge of how each factor influences the outcome and it will help the company to develop an improvement plan.

When conducting an experiment, the results may be influenced by the vital X and the impact from Y. Suppose that five ranks are being evaluated for screening potential causes.

Rank	Vital x	Impact $	Impact %
1	Project or dept. Special Request	$ 58,760	48%
2	Personal preference item	$ 14,686	12%
3	Office Max out-of-stock at the time	$ 4,098	4%
4	Item less costly from other vendor	$ 3,773	3%
5	Item was needed immediately	$ 2,945	3%

Table 6 : Top Ranking Purchasing Causes

The impact from the top five vital X's could be reduced using the following methods:

- Eliminate online purchases by expanding the list of On-contract supplies offered in Office Max web tools
- Utilize Office Max's Retail Connection program to secure On-contract pricing for additional purchases.
- Disable the user's ability to order off-contract supplies
- Require that the other vendors are minimized exception for emergency needs
- Require a $100 minimum order size to ensure lower pricing

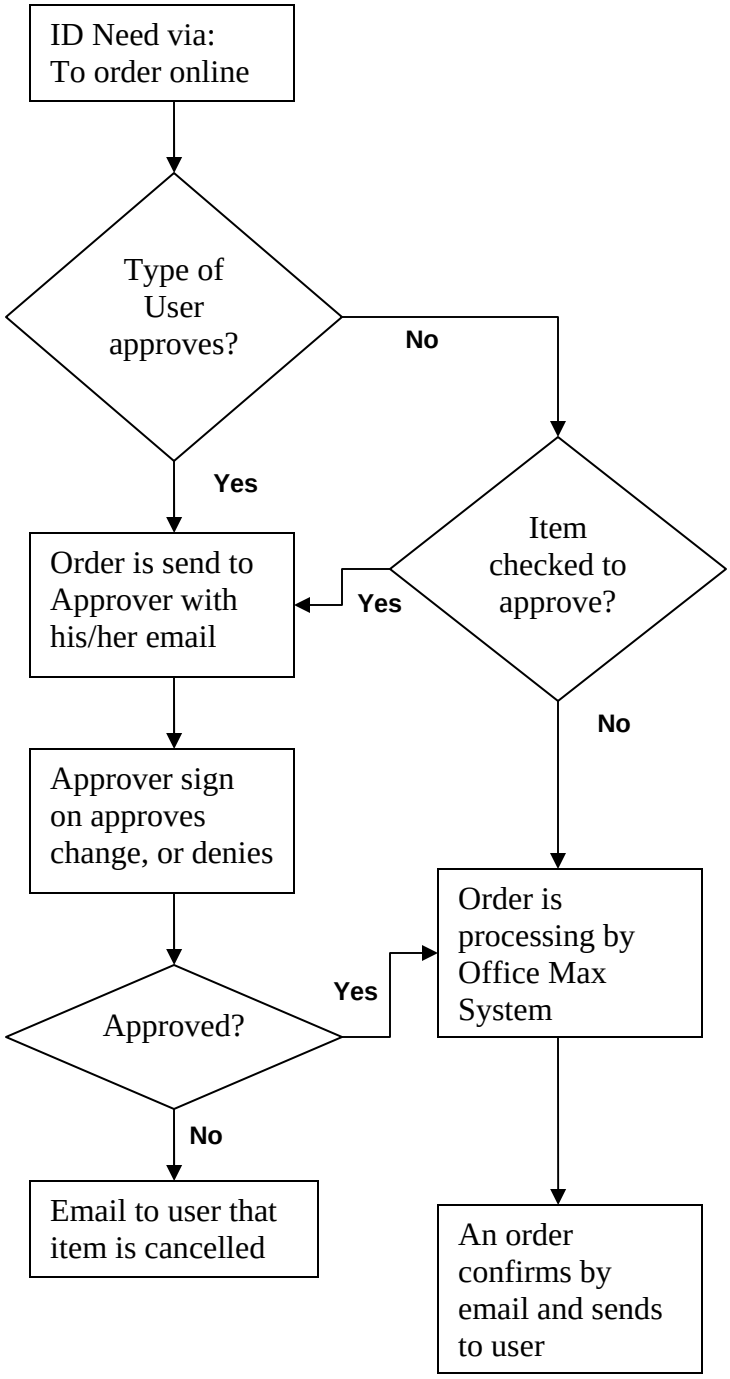


Figure 15: New Process Flow for Office Max Online Supply Orders

CONTROL PHASE

The Control phase is required to document and maintain accountability for sustaining the gains made by the process improvements. Two plans will be created: the control plan and communication plan.

	Project Y	Vital X(1)	Vital X(2)
Metric	Cost of Office & Tech. Supplies	Off-contract purchases	Other Vendor purchases
Scope	Location	On-line & Retail purchases	Other Vendor purchases
Data Source	Compilation	Office Max report	Card records
Specific Measure	Dollars saving	Reduction of Off-contract purchases	Reduction of Other Vendor purchases
Frequency	Quarterly	Quarterly	Quarterly
Responsible Party	Contract Admin.	Contract Admin.	Contract Admin.

Table 7 : Control Plan

Action	Audience	Responsible Party	Target Date
Distribute letter & Corp. Instruction to Division Mgmt.	Owners of budgets & supervisors of buyers	Project Team	To be determined
Dist. letter, Corp. Instruction, & Top 200 Catalog to buyers	Anyone who may buy office/tech supplies	Project Team	To be determined
Add message toOffice Max's web tool providing info. on changes	Anyone who may buy office/tech supplies	Administrator	To be determined
Assure that references and e-links lead users to system.	Anyone viewing related documents	Project Team	To be determined
Post Corp. Instruction online	Employees	Technical Support	To be determined

Table 8 : Communication Plan

Results and conclusions

The improve phase of the DMAIC methodology identify the following strategies to reduce office supply costs:

- Eliminate online purchases by expanding the list of On-contract supplies offered in Office Max web tools
- Utilize Office Max's Retail Connection program to secure On-contract pricing for additional purchases.
- Disable the user's ability to order off-contract supplies
- Require that the other vendors are minimized exception for emergency needs
- Require a $100 minimum order size to ensure lower pricing

These strategies are anticipated to save approximately $120,000 in 2006. Table 9 show the expected saving broken down by reason for purchase. (Refer to Table 9)

	Expected Saving		Project Saving		
Reasons for Purchase	**Office Max Off-Contract**	**Other Vendor**	**Office Max Off-contract$**	**Other Vendor $**	**TOTAL $**
Project or Department Special Request	49%	8%	58,760	9,653	68,413
Personal preference item	12%	6%	14,686	8,195	22,881
Office Max out-of-stock at the time	4%	6%	4,098	7,638	11,736
Item less costly from other vendor	3%	2%	3,773	1,889	5,662
Item was needed immediately	3%	5%	2,945	6,098	6,098
On-contract item unavailable	1%		509		509
Office Max Retail Purchases	1%		445		445
			82,271	**33,473**	**115,744**

Table 9 : Expected Project Savings

If Off-contract and other vendor purchases are reduced, total savings will be $115,744.

Current Undesired Mode Of Purchase	**Project Savings**
Off-Contract	$82,271
Other Vendor	$33,473
Total	$115,744

The final result of the office supplies project is to determine the post-improvement process capability (Z) and performance. This will establish closure with the financial department regarding validation of estimated project benefits.

Process	Total of Number Defects	Total of Number Units	Total Defect %	DPMO	Long Term Capability	Z shift	Short Term Capability
Baseline	D	U	D/ (U^OP)	DPMO	Z_{LT}	Shift	Z_{ST}
Office Max Purchases	95,845	384,835	25%	250,000	0.67	1.5	2.17
Other Vendor Purchases	27,459	116,181	23%	230,000	0.74	1.5	2.24
Total	123,304	501,016	24%	480,000	0.71	1.5	2.21

Table 10 : Improvement to the Process Capability

Conclusion

Six Sigma is a change management strategy that provides a common language for improvement and understanding of a process internally and externally. Six Sigma aids a company in improvement of overall quality. In fact, Six Sigma projects are based on using company's data to apply improvement methodologies for continuous quality solution. Then, processing can be continuously improved and defect minimized.

There are many methodologies in Six Sigma; though the commonly used methodology is DMAIC. The methodology applies a logical plan to combine statistical analysis with process knowledge. The method involves defining the problem and converting it into a statistical problem, solving the statistical problem, and then converting the solution into results.

Management achieves a competitive advantage by providing tools for improvement efforts to eliminate defects for customers. Six Sigma has a very high focus on the customer's needs. By listening to the voice of the customer, the company can find out what is the most important to the customer. Companies which adopt the Six Sigma to meet the needs of customers will improve their ability grow and prosper.

The success of the office supplies cost optimization project will allow V&P to implement other Six Sigma project in future.

Suggestions for Additional Work

At the present time, V&P has started implementing Six Sigma. The Finance Department has an initiative to train Six Sigma Green Belts in the use of Six Sigma analysis tools. However, the initial launch lacks the upper management support in the form Champions and most importantly a strategic initiative of the manager.

The office supplies reduction project should provide more visibility about the opportunity for implement Six Sigma within V&P. Top executives should be informed of the results for this project and order to achieve buy-in for future Six Sigma initiatives.

Glossary

A

Accuracy – The measured value has little deviation from the target.

Analyze phase – The analyze phase involves identifying the upstream variables (Xs) for each CTQ using a flowchart. Upstream variables are the factors that affect the performance of a CTQ. Additionally, the analyze phase involves operationally defining each X, collecting baseline data for each X, performing studies to determine the veracity of the measurement system for each X, establishing baseline capabilities for each X, and understanding the effect of each X on each CTQ.

B

Baseline – The level of process performance when a project is initiated.

Black Belt – A Black Belt is a full-time change agent and improvement leader who may not be an expert in the process under study. A Black Belt is an individual who processes a deep understanding of statistical methods and have successful led two or more Six Sigma projects that have led to dramatic quality improvements and cost reductions.

Business Objectives – Business objectives are the goals that must routinely be pursued within an organization if it is to function.

C

Cause – That which produces an effect or brings about a change.

Characteristic – A definable or measurable feature of a process, product, or variable.

Champion – Champions take a very active sponsorship and leadership role in conducting and implementing Six Sigma project.

Control – The state of stability, normal variation, and predictability. Process of regulating and guiding operations and processes is using quantitative data.

Control Chart – A graphical rendition of a characteristic's performance across time in relation to its natural limits and central tendency. Aides are in the recognition of variations and their causes in order to improve process performance. To provide, a common ground is for evaluating process performance.

Control phase – The control phase involves avoiding potential problems with the Xs with risk management and mistake proofing, standardizing successful system revisions, controlling the critical Xs, documenting each control plan, and turning the revised system over to the system owner.

Control Plan – A process control document that describes the system for controlling processes and maintaining improvements.

Critical To Quality (CTQ) – Elements of a process or practice which have a direct and significant impact on its perceived quality. A characteristic of a product, service, or information that is important to the customers. CTQs must be measurable in either a "quantities" manner such as correct or incorrect. Usually defined by the customer and often known as Big "Y".

Customer – Anyone who receives a product, service, or information from an operation or process. The term is frequently used to describe "external" customers, those who purchase the products or services that are the basis for existence of the business. However, "internal" customers are also important. An internal customer receives the intermediate or internal products or services from internal "suppliers."

D

Data – Factual information used as a basis for reasoning, discussion, or calculation; often refers to quantitative information.

Defect – Anything that fails to satisfy a client requirement or internal standard must be measurable. Defects are costly to both customers and to manufactures or service providers and eliminating them provide cost benefits to both.

Defective – A unit of product containing one or more defects.

Define Measure Analyze Improve Control (DMAIC) – Five phases of the Six Sigma step-by-step process for continuous process improvement.

Define phase – The define phase involves preparing a business charter, understanding the relationships between Suppliers-Inputs-System-Outputs-Customers, and analyzing Voice of Customer data to identify the CTQs characteristics important to customers and to developing a project objective.

Design for Six Sigma (DFSS) – Application of Six Sigma tools to process design efforts with the goals of "designing in" Six Sigma performance capability. Normally used for areas where processes are lacking or where substantial step change is required.

Distribution – Tendency of large numbers of observations to group themselves around some central value with a certain amount of variation or "scatter" on either side.

E

Effect – That was produced by a cause.

Experiment – A test under defined conditions to determine an unknown effect; to illustrate or verify a known law; to test or establish a hypothesis.

Event – An event is the most basic unit for analysis in a statistical study.

Expectation – Needs, as defined by customers, which meet their basic requirements and standards.

G

Green Belt – A Green Belt is an individual who works on projects part time as a team member for complex projects or as a project leader for simple projects.

Goal statement – The goal statement describes the team's improvement objective. It begins with the verb such as reduce, eliminate, control, or increase.

H

Hard Benefits – Hard (financial) benefits include but are not limited to increasing revenues or decreasing costs that affect the bottom-line of an organization.

I

Improve phase – The improve phase of the DMAIC model involves designing experiments to understand the relationships between the CTQs and Xs, determining the levels of the critical Xs that optimize the CTQs, developing action plans to formalize the level of the Xs that optimize the CTQs and conducting a pilot test of the revised system.

L

Lower specification limit – LSL is the maximum acceptable value of a variable.

M

Measure phase – The Measure phase of the DMAIC model involves developing operational definitions for each CTQ, performing studies to determine the validity of the measurement procedure for each CTQ, and establishing baseline capabilities for each CTQ.

N

Normal Distribution – A continuous, symmetrical density function characterized by a bell-shaped curve.

P

Process Capability – The relative ability of any process to produce consistent results centered on a desired target value when measured over time.

Process Map – Illustrated description of how things get done, which enables participants to visualize an entire process and identify areas of strength and weakness. It helps reduce cycle time and defect while recognizing the value of individual contributions.

Project – A project is a process improvement activity in which the necessary process change is unknown by the Process Owner.

Project scope – The project scope identifies the boundaries of a Six Sigma project.

Q

Quality – Ability to meet the needs of a customer. A perception marked by a customer that is valued by the customer.

R

Reliability – It is consistently repeatable overtime.

S

Sigma – Greek symbol used to represent standard deviation. An empirical measure based on the analysis of random variation in a standard distribution of values. It is a measure of the data distribution or spread about the average for procedure.

Soft Benefits – Soft benefits of a Six Sigma project include but are not limited to improving quality and morale, and decreasing cycle time.

Specification – The engineering requirement or customer requirement for judging acceptability of a particular characteristic such as Upper Specification limit (USL) or Lower specification limit (LSL).

Standard deviation – The standard deviation is a measure of variation around the arithmetic mean.

U

Upper specification limit – USL is a value below which performance of a product or process is acceptable.

V

Variable – A characteristic that may take on different values.

Variation – Any quantifiable difference between individual measurements. Such differences can be classified as being due to random or assignable.

Voice of the Customer – VOC is a process used to capture the requirements from the customer from internal or external to provide the customers with the best in product quality. This process is data in formal or informal by customers' satisfaction such as quality, reliability, price, or availability that is measured and examined.

Voice of the Process – VOP is the plot it on a control chart that have time sequenced events across the bottom (x-axis) and the individual results up the side (y-axis). To calculate the normal variation ranges and plot these as line below and above the average the process is giving

Z

Z shift – is assumed to be 1.5 ($Z_{ST} = Z_{LT} + 1.5$) using Process Capability.

Acronyms

CTQ – Critical to Quality

DFSS - Design for the Six Sigma

DMAIC – Define, Measure, Analyze, Improve, and Control

LSL – Lower Specification Limit

USL – Upper Specification Limit

VOC – Voice of the Customer

VOP – Voice of the Process

Z_{LT}– Z shift of long term

Z_{ST} – Z shift of short term

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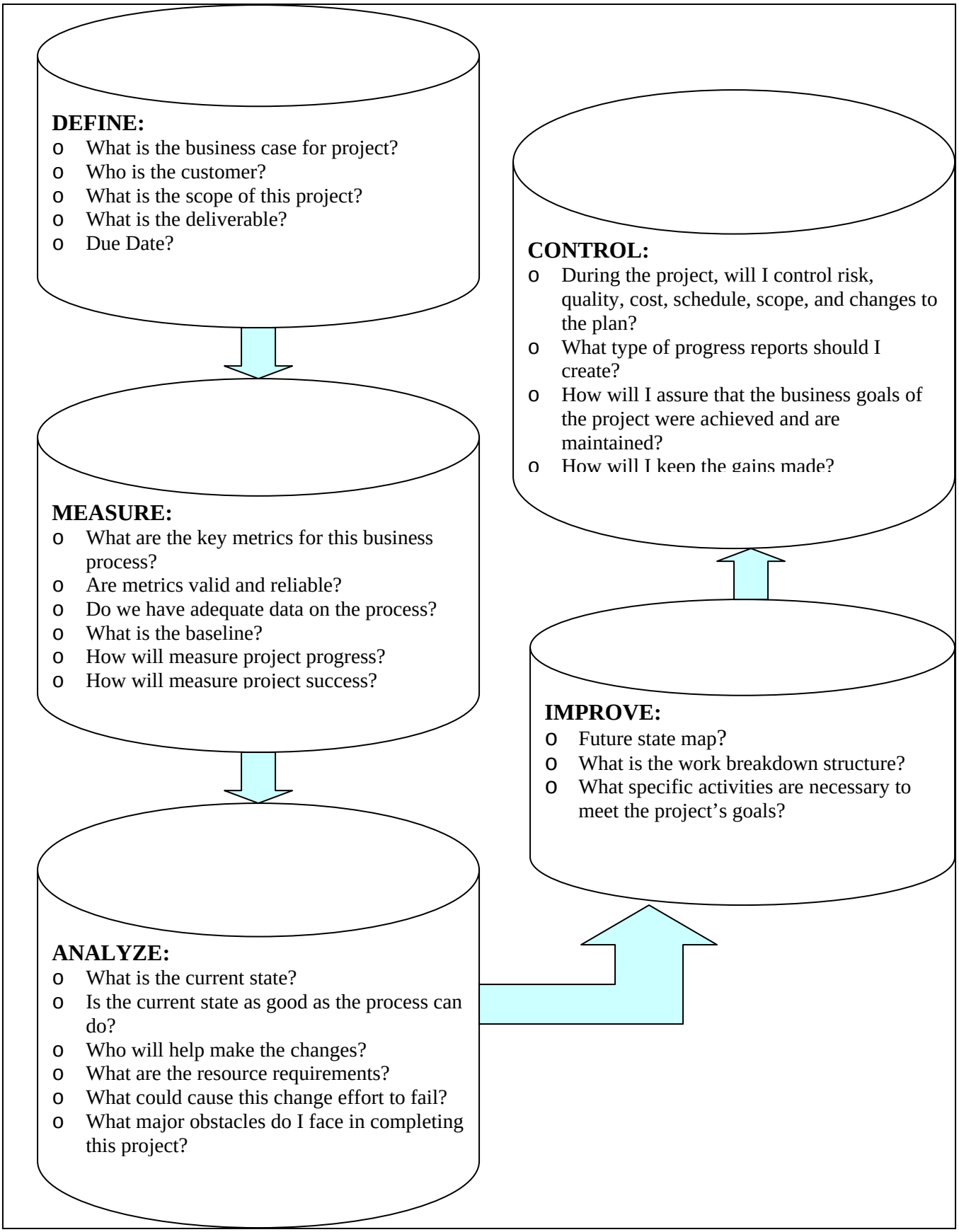
APPENDIX - DMAIC Methodology

DMAIC

The DMAIC method includes five phases of improving any existing process – Define, Measure, Analyze, Improve, and Control. These phases are virtually the same in any company that has adopted what is now known as Six Sigma.

Six Sigma team members can use the DMAIC methodology to improve the process. To use this method successfully, the team member must be familiar with the goals and outputs of each phase and use the necessary tools to complete the project.


DEFINE:
What is the business case for project?
Who is the customer?
What is the scope of this project?
What is the deliverable?
Due Date?
MEASURE:
What are the key metrics for this business process?
Are metrics valid and reliable?
Do we have adequate data on the process?
What is the baseline?
How will measure project progress?
How will measure project success?
ANALYZE:
What is the current state?
Is the current state as good as the process can do?
Who will help make the changes?
What are the resource requirements?
What could cause this change effort to fail?
What major obstacles do I face in completing this project?
IMPROVE:
Future state map?
What is the work breakdown structure?
What specific activities are necessary to meet the project's goals?
CONTROL:
During the project, will I control risk, quality, cost, schedule, scope, and changes to the plan?
What type of progress reports should I create?
How will I assure that the business goals of the project were achieved and are maintained?
How will I keep the gains made?

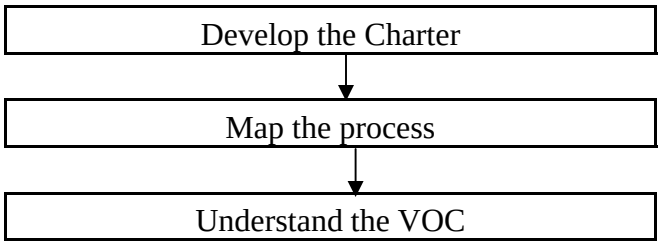
The Define Phase

Goals and Outputs

The goal is to define the project's purpose, scope, and obtain background information about the process and the customers.

The output of define phase consists of a clear statement of intended improvement and how to measure the process. Also, the map of the process is the key and a translation of the voice of the customer (VOC) into quality characteristic.

Process Flow



To define the scope and purpose of the project, first understand the boundaries of the process and the requirements of the customers. Include this information is, along with resources needed.

In practice, there is usually some give and take between these activities in that the defining of the project is the most important goal. The applicable tools for the define phase including the following:

1. Affinity Diagrams enable the team to organize and summarize the data.

2. Control Charts focus attention on detecting and monitoring process variation over time.
3. CTQ Tree is a feature by which customers evaluate the quality of the product or service. The CTQ Tree enables the team to describe the customers' needs and the corresponding measurable characteristics.
4. Data Collection from customers to help the team understand what is important in the project and set priorities.

The Measure Phase

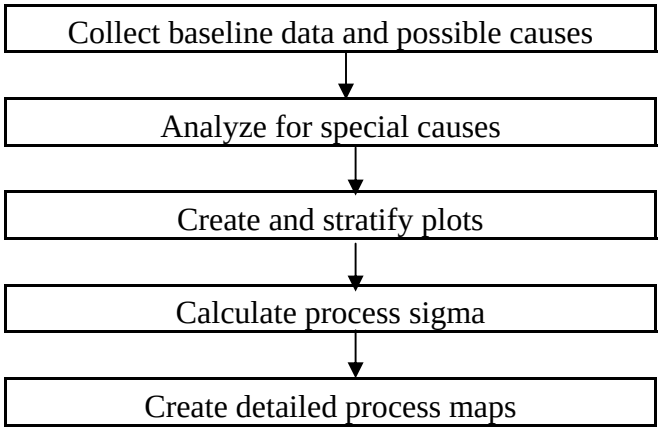
Goals and Outputs

The goal of the measure phase is to focus improvement effort by gathering information about the current situation.

The outputs of Measure phase include the following:

1. Data that pinpoints the problem's location or rate of occurrence.
2. Baseline data on how well the process is meeting customers needs (to determine the current process sigma).
3. An understanding of how the current process operates.
4. A more focused problem statement.

Process Flow



During the measure phase, the problem is investigated in detail to determine specifically what, when, and where is happening. Also, Data is collected to create a performance baseline to compare the process performance after work on the improve phase. The applicable tools for the measure phase include the following:

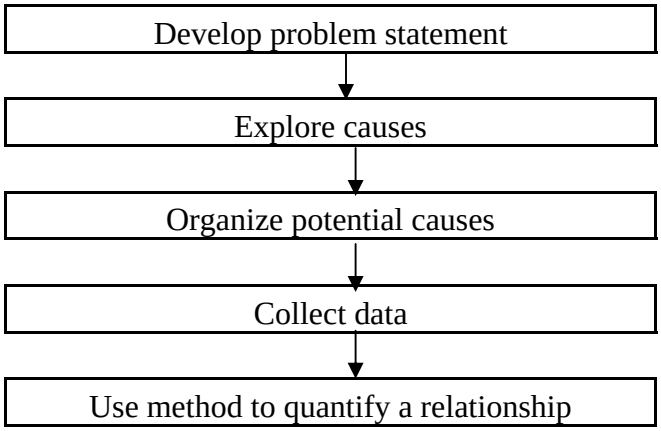
1. Operational Definitions are descriptions that describe how to get a value for each characteristic being measured.
2. Process Sigma calculations that describe the current process capability. Calculating a baseline process-sigma level provides a gauge for evaluation.

The Analyze Phase

Goals and Outputs

The goal of the analyze phase is to identify root causes and confirm them with data. The output of this phase is a theory that has tested and confirmed.

Process Flow



The analyze phase pinpoints the specific cause(s) of the focused problem statement that will develop as results of the Measure phase. Address the root cause(s) through solutions to implement in the improve phase. The applicable tools for the analyze phase include the following:

1. Brainstorming enables the team to creatively and efficiently generate a large number of ideas about causes of error.
2. Focused Problem Statement is described specifically what-when occurs and who is involved. The goal is to narrow the problem definition so you can effectively use your time and resources to find the solution.

3. Tree Diagram breaks down the broad categories of causes into increasing levels of detail. The team can use it to depict the links between causes and the effect on a problem.

The Improve Phase

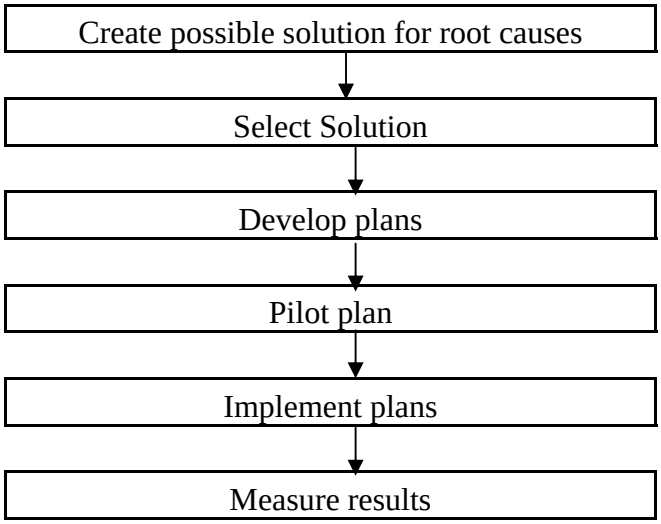
Goals and Outputs

The goal of the improve phase is to develop, try out, and implement solutions that address root causes and to use data to evaluate the solutions as well as the plans that use to carry them out.

The outputs of the improve phase include the following:

1. Planned, tested actions that eliminate or reduce the impact of the identified root cause(s) of a problem.
2. “Before” and “After” data analysis that shows how much of the initial gap was closed.
3. A comparison of the plan to the actual implementation.

Process Flow



The improve phase involves not only coming up with a solution but also how to implement the solutions. The applicable tools for the improve phase include the following:

1. Involvement Matrix helps team to think about who should be involved in the different phase needed to make change a reality, as well as the level of involvement that is appropriation.
2. Process Sigma is the true gauge of the effectiveness of any solution will show up in the new process sigma level.

The Control Phase

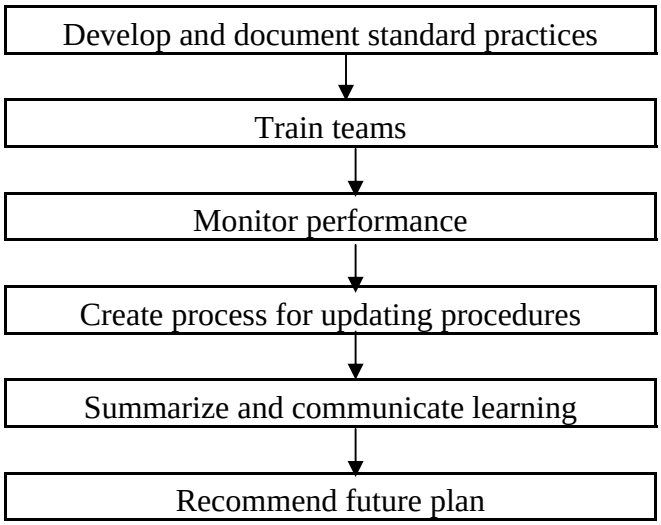
Goals and Outputs

The goal of the control phase is maintain the gains the company has made by standardizing work methods or processes, anticipating future improvements, and preserving the lessons from this effort.

The outputs of the control phase include the following:

1. Documentation of the new method
2. Training of fellow employees in the new method
3. A system for monitoring the consistent use of the new method and checking the results
4. Completed documentation and communication of the results, learning, and recommendations.

Process Flow



Many tools can help to monitor and control processes. The applicable tools for the control phase include the following:

1. Communication Plan helps the team to communicate effectively with the rest of the organization about the project.
2. Control Plan helps to monitor progress over time after project is completed. It will help the team continually quantify the capability of the process and identify when special events interrupt normal operations. It is typically part of the process management.