

Article Submission:

DMAIC Process Used for Academic Case Analysis

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About the Author:

Don Brecken is the Director of Quality for Commercial Tool & Die, Inc. located in Comstock Park, MI. His background includes quality leadership, continuous improvement, operations learning and development, management consulting, quality auditing, and management system implementation. Don has instructed management courses for Davenport University since 1998.

Don Brecken earned his MBA in Strategic Management from Davenport University's Sneden Graduate School. He also has three undergraduate degrees in business with a Technical Specialty in Quality Leadership.

Don is an ASQ Certified Quality Manager, RAB/QSA Quality Management System Business Improvement Auditor, and twice served on the Malcolm Baldrige National Quality Award Board of Examiners. Don also serves on the Section Leadership Committee for the American Society for Quality – Section 1001 (Grand Rapids).

DMAIC Process Used for Academic Case Analysis

Quality Management students at Davenport University in Grand Rapids, Michigan are usually quite pleased to learn I am willing to bend University rules and allow them to use a modified and much shorter than required, written case analysis format in certain situations. What my students learn later is that this modified format is a variation of the Six-Sigma DMAIC process used in actual business applications. This article defines the *Modified Case Analysis Steps for Improvement* my students use for certain case analyses, explains my rationale for allowing them to use this modified process, and highlights actual analysis performed by three teams of students using this approach.

Modified Case Analysis Steps for Improvement

The following *Modified Case Analysis Steps for Improvement* is the process my Quality Management students use for case analysis.

Modified Case Analysis Steps for Improvement

Step 1 – Define

Recap the relevant facts of the case or project and define the problem.

Step 2 – Measure

Determine the extent of the problem in the case or project.

Step 3 – Analyze

Analyze the problem presented in the case to determine the root cause(s).

Step 4 – Improve

Take or prescribe steps to fix the problem by solving for the root cause(s).

Step 5 – Control

Provide a plan to institutionalize the improvements to control future performance.

Quality Management students at Davenport University in Grand Rapids, Michigan use these steps to analyze cases in class. These steps are based on the Six-Sigma DMAIC problem solving process. This process, along with some coaching, helps students effectively analyze written case studies, determine root-cause(s) for problems, come to good conclusions, and specify good corrective actions, all while they learn this popular methodology for improvement.

My Rationale for Using this Process

Case studies simulate real life scenarios and help develop a student's critical thinking, problem solving, and decision-making skills. Whether a case is straightforward or highly complex, a structured problem solving process consistently applied and understood should prepare students to problem solve in the real world. Since more and more organizations are using Six-Sigma, it makes perfect sense to have my students learn a problem solving methodology based on Six-Sigma, such as the *Modified Case Analysis Steps for Improvement* defined above.

The University-specified case analysis approach is good and it does teach students to “problem-solve” and think critically. This format, however, is far too complex and cumbersome for certain learning team situations. Learning team case assignments performed in class, like the assignment that follows, requires a problem solving process that is agile, efficient, and easy to understand and use.

The Case Assignment

Constraints are applied to cases assigned in my Quality Management course to ensure the Learning Team experience is much the same as the student would experience in an actual

work environment. This case assignment was constrained in the following manner: Students were randomly assigned to Learning Teams (you can't always pick your team in the real world). Each team had only one (1) hour (strictly imposed deadline) to analyze the case using the *Modified Case Analysis Steps for Improvement*. Each case analysis had to be well thought out, well written (must be good quality), answer any assigned case questions (must be complete), and incorporate just-in-time learning from the assigned reading. Finally, at the end of the hour, students presented their case analysis findings and recommendations.

Welz Business Machine Case

The Welz Business Machine case below was taken from the textbook used for my Quality Management course at Davenport University, Grand Rapids, Michigan. The textbook is: Total Quality: Management, Organization, and Strategy, Evans, James, 4th edition, ISBN 0324301596. The case begins on page 305 and is reprinted in its entirety here:

Welz Business Machines ¹⁶

Welz Business Machines sells and services a variety of copiers, computers, and other office equipment. The company receives many calls daily for service, sales, accounting, and other departments. All calls are handed centrally by customer service representatives and routed to other individuals as appropriate.

A number of customers had complained about long waits when calling for service. A market research study found that customers became irritated if the call was not answered within five rings. Scott Welz, the company president, authorized the customer service department manager, Tim, to study this problem and find a method to shorten the call-waiting time. Tim met with the service

representatives who answer the calls to attempt to determine the reasons for long waiting times. The following conversation ensued:

Tim: This is a serious problem. How a customer phone inquiry is answered is the first impression the customer receives from us. As you know, this company was founded on efficient and friendly service to all our customers. It's obvious why customers have to wait: You're on the phone with another customer. Can you think of any reasons that might keep you on the phone for an unnecessarily long time?

Robin: I've noticed quite often that the person to whom I need to route the call is not present. It takes time to transfer the call and to see whether it is answered. If the person is not there, I end up apologizing and transferring the call to another extension.

Tim: You're right, Robin. Sales personnel often are out of the office on sales calls, away on trips to preview new products, or away from their desks for a variety of reasons. What else might cause this problem?

Ravi: I get irritated at customers who spend a great deal of time complaining about a problem that I cannot do anything about except refer to someone else. Of course, I listen and sympathize with them, but this eats up a lot of time.

Lamarr: Some customers call so often, they think we're long-lost friends and strike up a personal conversation.

Tim: That's not always a bad thing, you realize.

Lamarr: Sure, but it delays my answering other calls.

Nancy: It's not always the customer's fault. During lunch, we're not all available to answer the phone.

Ravi: Right after we open at 9 a.m., we get a rush of calls, I think that many of the delays are caused by these peak periods.

Robin: I've noticed the same thing between 4 and 5 p.m.

Tim: I've had a few comments from department managers who received calls that didn't fall in their areas of responsibility and had to be transferred again.

Mark: But that doesn't cause delays at our end.

Nancy: That's right, Mark, but I just realized that sometimes I simply don't understand what the customer's problems really is. I spent a lot of time trying to get him or her to explain it better. Often, I have to route it to someone because other calls are waiting.

Ravi: Perhaps we need to have more knowledge of our products.

Tim: Well, I think we've covered most of the major reasons why many customers have to wait. It seems to me that we have four major reasons: the phones are short-staffed, the receiving party is not present, the customer dominates the conversation, and you may not understand the customer's problem. Next we need to collect some information about these possible causes. I will set up a data collection sheet that you can use to track some of these things. Mark, would you help me on this?

Over the next two weeks, the staff collected data on the frequency of reasons why some callers had to wait. The results are summarized as follows:

Reason	Total number
Operators short-staffed	172
Receiving party not present	73
Customer dominates conversation	19
Lack of operator understanding	61
Other reasons	10

Discussion Questions

1. From the conversations between Tim and his staff, draw a cause-and-effect diagram.
2. Perform a Pareto analysis of the data collected.
3. What actions might the company take to improve the situation?

My students analyzed the Welz Business Machine case. Their use of the *Modified Case Analysis Steps for Improvement* in class, with constraints added, gave them real experience using a DMAIC problem solving process, albeit simulated. Their team case analysis follows:

Learning Team Case Analysis – Team 1

Students: A.J. Johnson, Paul Bronsink, Matt Barnard, and Curt Van Maldegen

Step 1 – Define

Recap the relevant facts of the case or project and define the problem.

This case deals with Welz Business Machines and its inability to answer customer calls effectively. This company receives many calls for service, sales, accounting, and other departments. Conversations between a number of employees resulted in four main reasons for delays in phone answering.

Step 2 – Measure

Determine the extent of the problem in the case or project.

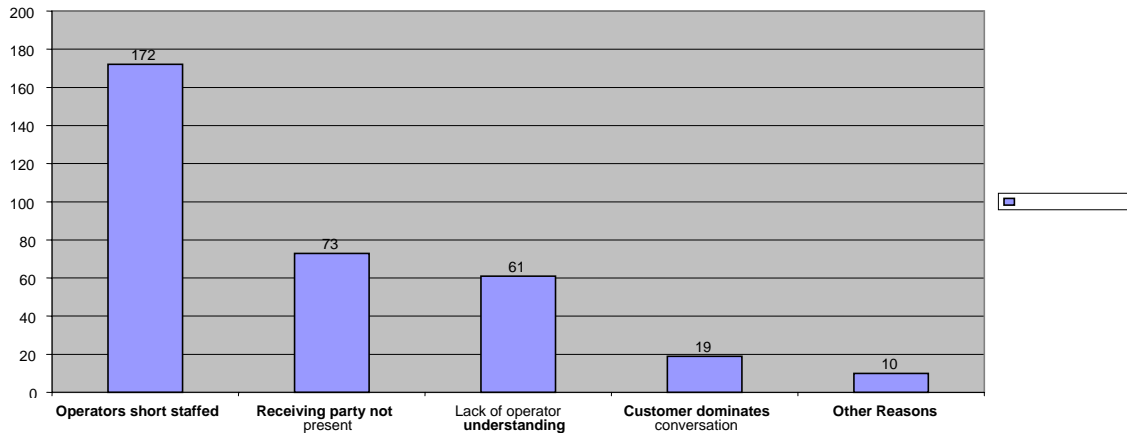
This problem is affecting all of the departments of the business in the form of customer service, because of its inability to answer questions from the customers on different products or other issues. Many of the customers may stop returning if customer service continues to suffer, and this will definitely affect the financial position of the business. From the information collected during the conversation, the extent of the problem for the phone operators is excessive workload and presumed higher stress level due to this.

Step 3 – Analyze

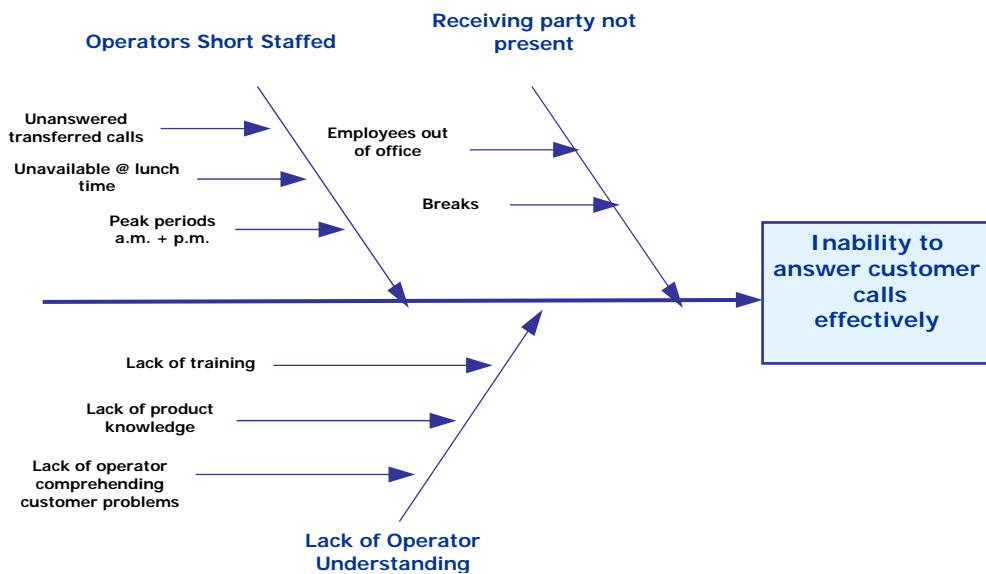
Analyze the problem presented in the case to determine the root cause(s).

According to the information collected by the characters, the primary cause for missed calls is short-staffed operators. The next two causes occurring the most are receiving parties not present, and lack of operator understanding what the problem is. The other causes listed from the information collected by the characters are customer domination of conversation and other reasons (See Pareto analysis graph and cause and effect diagram below).

Summarized Frequency Reasons



CAUSES OF LOW CUSTOMER SATISFACTION



Step 4 – Improve

Take or prescribe steps to fix the problem by solving for the root cause(s).

The first step that would address the root of this problem would be increasing the staff to operate and answer the phones. A second step that may help would be to implement a training strategy for new and existing employees, which should increase efficiency in dealing with customer calls. In dealing with receiving parties not being present, set up a voice mail system for employees who leave the premises frequently and a procedure to ensure calls will be returned promptly.

Step 5 – Control

Provide a plan to institutionalize the improvements to control future performance.

One of the key ways in which we will continually improve this system is conducting customer satisfaction surveys over the duration of implementation or for as long as needed. The company will also require intermittent training for phone operators who are having problems or just starting.

Learning Team Case Analysis – Team 2

Students: Joel Eenigenburg, Lianne Densham, Robin Wait, and Josh Goodale

Step 1 – Define

Recap the relevant facts of the case or project and define the problem.

Welz Business Machines is currently dealing with several issues relating to their customers having to wait for an excessive amount of time before talking to a customer service representative. There are four main reasons as to why customers have to wait: the phones are short-staffed, the receiving party is not present, the customer dominates the conversation, and the fact that the customer service representative may not understand the customer's problem.

Step 2 – Measure

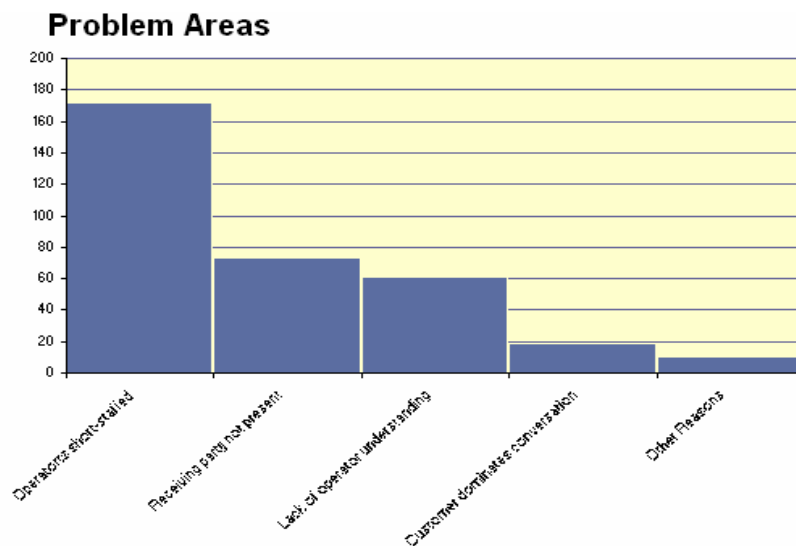
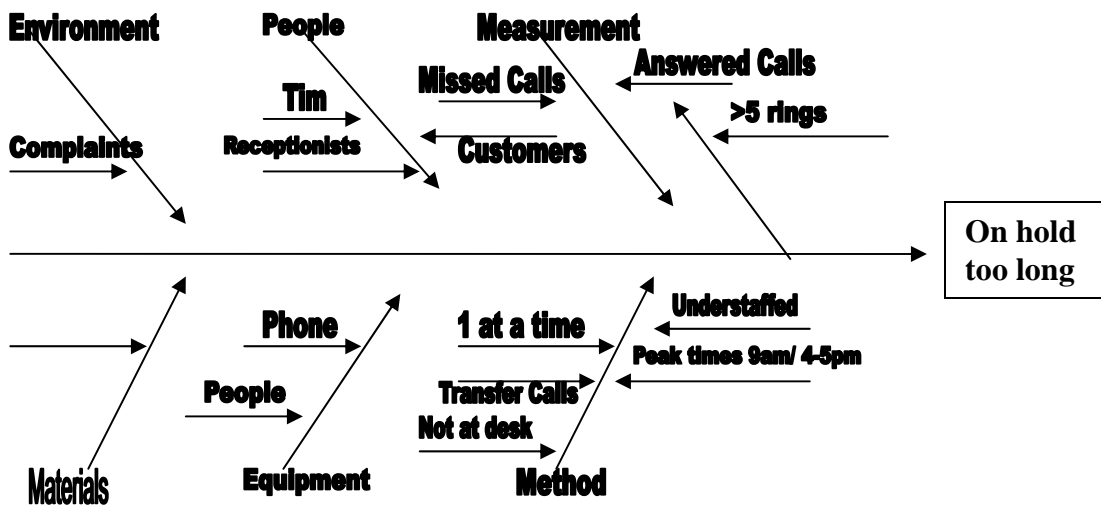
Determine the extent of the problem in the case or project.

Throughout a two-week time period, the staff at Welz Business Machines collected data on the frequency of reasons why some customers have to wait. Through this process, the company was able to pinpoint areas in which the customer's were affected the most in their wait time. The fact that the customer service representatives appear to be short staffed equates to 172 customer's having to wait. The next highest complaint was that the receiving personnel were not present at their desks to answer the customer's questions, which in turn, caused 73 customer complaints. In addition, customer service representatives are not able to completely understand the extent of the customer's problems, which resulted in 61 customer complaints.

Step 3 – Analyze

Analyze the problem presented in the case to determine the root cause(s).

According to the data that was collected throughout a two-week time period, it was determined through cause and effect and Pareto analysis, that the root causes are that there is not adequate numbers of employees in place. This involves having the appropriate people to answer the customer's calls as well as having the appropriate people available to answer these customer's questions. In addition to this, it appears that the staff currently in place has received a lack of training.



Step 4 – Improve

Take or prescribe steps to fix the problem by solving for the root cause(s).

In order to fix the problem, the first step is to recruit additional employees. This will allow for a greater number of employees to answer customers' calls. Second, when these new employees are hired, they will be required to attend an in-depth training program to familiarize them with Welz Business Machines. In addition, current employees will be required to attend a similar training program as a means to improve their current job skills. Because of this, all of the employees, both new and current, will be on the same page with regard to customer questions that may arise.

Step 5 – Control

Provide a plan to institutionalize the improvements to control future performance.

A plan of action will be put in place that will require new employees to take part in a training program. This program will consist of computer as well as classroom training in a two-week time period. All new employees will be required to attend in order to begin working full time. All current employees will be required to attend a one day training session once per week throughout a four week period. This will include tools that will help the employees to better answer the customer's questions. This training will allow employees to ask the questions they are asked frequently that they do not know the answers to as a way to improve the customer/employee relationship. Additionally, new and current employees will meet together at the end of both of their training sessions to ensure that both groups are on the same level of understanding.

After this, post testing will be performed for both new and current employees at the end of the combined group session to determine whether they have mastered the training and are on the same page. If the employee does not pass the test, then they will be required to attend future training sessions.

Learning Team Case Analysis – Team 3

Students: Christine Kramer, Greg Lewis, Creschone White, and Rebecca Smith

Step 1 – Define

Recap the relevant facts of the case or project and define the problem.

Customer calls are not being answered in a timely manner because all operators are overwhelmed by the volume of calls. They are receiving calls for sales people who are not in the office and they are not understanding customers' needs.

Step 2 – Measure

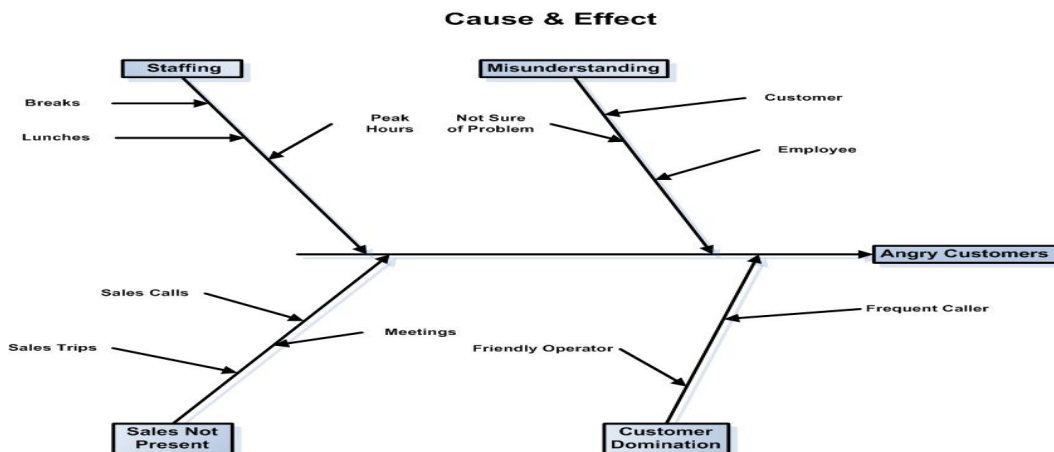
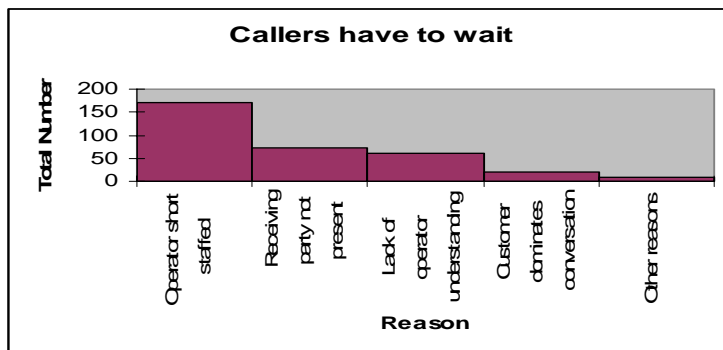
Determine the extent of the problem in the case or project.

Customers are mad because they have to wait longer than five rings to get an operator. The employees are getting upset because of the volume of calls they have to answer.

Step 3 – Analyze

Analyze the problem presented in the case to determine the root cause(s).

The major reason for customers having to wait is because Welz Business Machines do not have enough operating staff to handle the amount of incoming calls. The sales people that the customer may be trying to call are often out of the office and the operators have no way of knowing which sales persons are available to take calls.



Step 4 – Improve

Take or prescribe steps to fix the problem by solving for the root cause(s).

The operators need to have some kind of way to know which sales people are available. One suggestion is a board that the sales people can write 'in' or 'out.' Another possibility is to have the sales peoples' Outlook calendar available to the customer service representatives. They could also schedule operator staff breaks during slow call in times and possibly take on some part time staff during peak hours. They should also set guidelines for how long customers should be on hold.

Step 5 – Control

Provide a plan to institutionalize the improvements to control future performance.

Customer surveys for customers to fill out and to see if wait time is satisfactory. Track weekly performance of customer hold time and reasons in graph format that are to be discussed among the operators and other appropriate personal.