



- Learn the basics of Six Sigma
- Select the best people and projects
- Apply the methodology and tools

# SIX SIGMA FOR MANAGERS



GREG BRUE

# Preface

Six Sigma is best described as a journey—a journey for business professionals who are truly committed to improving productivity and profitability. Six Sigma isn't theoretical; it's an active, hands-on practice that gets results. In short, you don't *contemplate* Six Sigma; you *do* it. And doing it has proven to be the fast track to vastly improving the bottom line.

The Six Sigma story began in the 1980s at Motorola, where it was first developed and proven. In 1983, reliability engineer Bill Smith concluded that if a product was defective and corrected during production, then other defects were probably being missed and later found by customers. In other words, process failure rates were much higher than indicated by final product tests. His point? If products were assembled completely free of defects, they probably wouldn't fail customers later.

This is where Six Sigma took off. Mikel Harry, Ph.D., the founder of the Motorola Six Sigma Research Institute, further refined the methodology, to not only eliminate process waste, but also turn it into growth currency—regardless of the specific type of service, product, or market sector. The rest, as they say, is history.

Six Sigma statistically measures and reflects true process capability, correlating to such characteristics as defects per unit and probabilities of success or failure. Its value is in transforming cultural outlooks from complacency to accomplishment across the spectrum of industry.

Most companies function at four sigma—tolerating 6,210 defects per one million opportunities. Operating at six sigma creates an almost defect-free environment, allowing only 3.4

## Contents

<b>Preface</b>	<b>ix</b>
<b>1. What Is Six Sigma?</b>	<b>1</b>
Six Sigma Defined and Explained	2
Essentials of the Six Sigma Methodology	7
Focus on Engaging People and Changing Processes	9
Not Just Statistics, but Cultural Changes	11
Six Sigma Applied	13
What Six Sigma Is Not	18
Manager's Checklist for Chapter 1	20
<b>2. Why Do Six Sigma?</b>	<b>21</b>
Money	22
Customer Satisfaction	23
Quality	29
Impact on Employees	30
Growth	31
Competitive Advantages	32
Are You and Your Company Ready?	32
The Correlation Between Quality and Cost	34
Manager's Checklist for Chapter 2	35
<b>3. Setting Business Metrics</b>	<b>36</b>
A Little Statistics	38
Criteria for Business Metrics	44
What Is the Cost of Poor Quality?	52
Financial Linkage of Metrics and Results	52
Keeping Your Process Capability	60
Manager's Checklist for Chapter 3	61

**Other titles in the Briefcase Books series include:**

*Customer Relationship Management*

by Kristin Anderson and Carol Kerr

*Communicating Effectively* by Lani Arredondo

*Performance Management* by Robert Bacal

*Recognizing and Rewarding Employees* by R. Brayton Bowen

*Motivating Employees* by Anne Bruce and James S. Pepitone

*Leadership Skills for Managers* by Marlene Caroselli

*Negotiating Skills for Managers* by Steven P. Cohen

*Effective Coaching* by Marshall J. Cook

*Conflict Resolution* by Daniel Dana

*Project Management* by Gary R. Heerkens

*Managing Teams* by Lawrence Holpp

*Hiring Great People* by Kevin C. Klinvex,  
Matthew S. O'Connell, and Christopher P. Klinvex

*Empowering Employees* by Kenneth L. Murrell and Mimi  
Meredith

*Managing Multiple Projects* by Michael Tobis and Irene P. Tobis

*Presentation Skills for Managers*, by Jennifer Rotondo  
and Mike Rotondo

*The Manager's Guide to Business Writing*  
by Suzanne D. Sparks

*Skills for New Managers* by Morey Stettner

To learn more about titles in the Briefcase Books series go to  
**[www.briefcasebooks.com](http://www.briefcasebooks.com)**

You'll find the tables of contents, downloadable sample chapters, information on the authors, discussion guides for using these books in training programs, and more.

# **Six Sigma for Managers**



# What Is Six Sigma?

*Knowledge is power.*

—Francis Bacon (1561-1626)

**D**o you know, do you really know, what's going on in your organization? The assertion that knowledge is power rings as true today as it did four centuries ago. In any industry, organization, or daily process, when you don't know *what* you don't know, it's going to cost you. For too many organizations the costs (often hidden) of defects and waste in the way they operate are huge.

Having processes in which errors occasionally occur may not seem such a big deal. But when you consider how many errors may be lurking in company-wide processes, the monetary impact on overall productivity, customer satisfaction, and profitability multiplies dramatically! The Six Sigma approach to managing is all about helping you identify what you don't know as well as emphasizing what you should know, and taking action to reduce the errors and rework that cost you time, money, opportunities, and customers. Six Sigma translates that knowledge into opportunities for business growth.



**Process** Any repetitive action—be it in a transactional, manufacturing, or services environment. The Six Sigma methodology collects data on variations in outputs associated with each process, so that it can be improved and those variations reduced.

Many companies believe that dealing with errors is just part of the cost of doing business. But you don't have to accept that faulty logic. With Six Sigma, you can eliminate most errors, reduce your costs, and better satisfy your customers.

## Six Sigma Defined and Explained

Six sigma is a statistical concept that measures a process in terms of defects. Achieving six sigma means your processes are delivering only 3.4 million defects per million opportunities (DPMO)—in other words, they are working nearly perfectly. Sigma (the Greek letter  $\sigma$ ) is a term in statistics that measures something called standard deviation. In its business use, it indi-



**Sigma** A term used in statistics to represent standard deviation, an indicator of the degree of variation in a set of measurements or a process.

**Six sigma** A statistical concept that measures a process in terms of defects—at the six sigma level, there are only 3.4 million defects per million opportunities. Six Sigma is also a philosophy of managing that focuses on eliminating defects through practices that emphasize understanding, measuring, and improving processes.

cates defects in the outputs of a process, and helps us to understand how far the process deviates from perfection. (We'll get into the statistics in later chapters.)

A sigma represents 691462.5 defects per million opportunities, which translates to a percentage of nondefective outputs of only 30.854%. That's obviously really poor performance. If we have processes

functioning at a three sigma level, this means we're allowing 66807.2 errors per million opportunities, or delivering 93.319% nondefective outputs. That's much better, but we're still wasting

money and disappointing our customers.

How well are your processes operating? Are they three sigma? Four sigma? Five?

Most organizations in the U.S. are operating at three to four sigma quality levels. That means they could be losing up to 25% of their total revenue due

to processes that deliver too many defects—defects that take up time and effort to repair as well as creating unhappy customers. Is that good enough? The answer is simple. No it's not when you could be doing a lot better. Helping you do that is what this book is about.

The central idea of Six Sigma management is that if you can measure the defects in a process, you can systematically figure out ways to eliminate them, to approach a quality level of zero defects.


So, in short, Six Sigma is several things:

- A statistical basis of measurement: 3.4 defects per million opportunities
- A philosophy and a goal: as perfect as practically possible
- A methodology
- A symbol of quality

### Six Sigma in Context

Let's take an example, an all-too-familiar scenario: lost luggage at the airport. Many of us have experienced the frustration of watching the baggage carousel slowly revolve while waiting for luggage that never arrives. The system is far from perfect. But just how far, in sigma measurement terms?

In general terms, the baggage handling capability of many airlines is performing at around the three sigma level. That means



**Defect** A measurable characteristic of the process or its output that is not within the acceptable customer limits, i.e., not conforming to specifications. Six Sigma is about practices that help you eliminate defects and always deliver products and services that meet customer specifications. The sigma level of a process is calculated in terms of the number of *defects* in ratio to the number of *opportunities* for defects.



there are about 66,000 “defects” for every one million luggage transactions, which equates to an approximate 94% probability that you’ll get your luggage. Is that good enough? Certainly not for the customers whose bags are among the “defects.” The “defects” increase costs for the airlines, because employees must deal with misplaced luggage and unhappy passengers. And those “defects” can result in lost business in the future.

If the airline moves to six sigma in luggage handling, it clearly pays off in terms of lower costs and happy passengers, who are then more likely to fly with that airline again.

As Figure 1-1 indicates, operating at anything less than six sigma levels means your processes have higher probabilities of delivering defects.

It may seem like three sigma is good enough. After all, if

Sigma Level (Process Capability)	Defects per Million Opportunities
2	308,537
3	66,807
4	6,210
5	233
6	3.4

Figure 1-1. Probability of defects of different sigma levels

there are 66,807 defects out of a million, that means that 933,193 things went well—93.319% perfection.


But if the airline is taking comfort in those statistics, it’s losing money and losing customers. Consider this three sigma level from another perspective.

For *customers*, three sigma represents highly unsatisfactory performance. The airline is not meeting their most basic expectation—that their luggage will be put on the same flight, to travel with them to the same destination. So the airline is likely to be losing many of those frustrated customers.

Three sigma is also costing money. Variations—time, waste, and errors—abound in the baggage-handling process: misrouting the baggage, reporting the problem, processing the report, searching, retrieving, and finally delivering the lost luggage. When you translate the 6% probability gap of missing luggage into monetary terms, the hard cost of this defect can be much higher than 6% of the overall cost of handling luggage—perhaps several million dollars per year. If the baggage-routing process were improved, the margin for error would be reduced and the allocation of resources, both human and monetary, could be much more profitably used.

How many customers can your business afford to lose?

How much money can your company afford to lose because of mistakes? Why accept it as normal to be running processes at only three sigma or four sigma when, by changing the way you manage your processes, you could get a lot closer to six sigma and all the resulting benefits.



**Variation** Any quantifiable difference between a specified measurement or standard and the deviation from such measurement or standard in the output of a process. Variation in outputs can result from many causes in the functioning and management of processes. An important goal of process improvement is to reduce variation in outputs.

Six Sigma uncovers the layers of process variables—in data terms—that you must understand and control to eliminate defects and wasteful costs. It's a management approach that aims to achieve the apex of quality by measuring, analyzing, improving, and controlling processes to root out defects and boost bottom-line results.

### A Little History of Quality

Many people associate Six Sigma with the quality movement. So, it seems logical at this point to start from that perspective. How does Six Sigma differ from the “quality” programs you may have already experienced? To answer that question, let's briefly recap the history of the quality movement.