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The SIX SIGMA WAY

Doing
It Right
•
Getting Results
•
Avoiding the
Hype

60

How to Maximize the Impact of Your
Change and Improvement Efforts

Revised and Fully Updated Second Edition

PETER S. PANDE, ROBERT P. NEUMAN,
and ROLAND R. CAVANAUGH

THE SIX SIGMA WAY

**How to Maximize the Impact of
Your Change and Improvement Efforts**

SECOND EDITION

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Robert P. Neuman
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**New York Chicago San Francisco Athens London
Madrid Mexico City Milan New Delhi
Singapore Sydney Toronto**

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To Anne and Al Pande,
“Six Sigma” parents and my best friends.
—P.S.P.

To my dear wife, Mabel.
—R.P.N.

To my dad, Hale Cavanagh,
who would have been pleased and proud
to see the results of this undertaking.
—R.R.C.

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INTRODUCTION TO THE SECOND EDITION

When the first edition of this book was published back in 1999, it was one of only a couple of books on the subject of Six Sigma. Now, hundreds of books, websites, and blogs on Six Sigma (and *Lean Six Sigma*) are sliced into many different specialties and perspectives. It is rewarding to note, though, that our work has stood the test of time: *The Six Sigma Way* has sold more than 200,000 copies and has been translated into more than 20 languages, and *Forbes* magazine called it “one of the most important business books of the past 20 years.”

When we wrote the first edition, Six Sigma was still not well understood in business circles: although Motorola had championed Six Sigma in the late 1980s, it was not really well-known until General Electric popularized it in the mid-1990s with the aggressive backing of then-CEO Jack Welch. Hearing GE and others touting its benefits prompted a lot of people to wonder “What is this Six Sigma thing all about?” Many organizations began trying to apply it themselves, which was one of the reasons we wrote the book. We felt then that a lot of misconceptions, misunderstandings, and narrow definitions surrounded Six Sigma and hampered its potential. And while a lot has been learned, good and bad, we feel that is *still* true today: Six Sigma has been packaged and repackaged and sold and resold under many different guises, so a lot of confusion remains about what it really is and how it can really help an organization.

One of the most pervasive problems with and misconceptions about Six Sigma is its name, which draws on statistics even though using statistics is only one (optional) element of the Six Sigma approach! The name *Six Sigma* was almost accidental, but the label has stuck, so we need to simply clarify what the approach really is and how it

can help. We continue to use it in the book (not only because it's in the title!) but also because it is still used in many organizations. And even though other terms have become nearly interchangeable with it, including *Lean Six Sigma*, *process excellence*, *performance excellence*, *business process improvement*, and others, all are greatly influenced by Six Sigma principles and practices. In fact, many organizations have chosen their own terminology or brand for the work that comes from Six Sigma to avoid that phrase altogether because it can sound intimidating or strange to a lot of people.

Regardless of what Six Sigma is called, it is still a powerful approach to driving organizational change and improvement, and we—along with our colleagues at McGraw-Hill—felt it was time for a new edition to this book. The fundamental descriptions of what Six Sigma is, how it works, and how *you* can use it and adapt it to the specific needs of *your* organization are still true, accurate, and valid. But we wanted to update and build on the experience of many organizations that have applied Six Sigma over more than a decade, some with great success, some not. With plenty to update, the good news is that most of the core principles and tools still apply and much of the advice we offered in the first edition has proven accurate (even though we wish more had taken it to heart).

Six Sigma's Hidden Truths, Lessons Learned, and Potential Payoffs

To help you get the greatest possible benefit from Six Sigma, it is important to recognize some of the misunderstood truths about what it offers, how it works, and where its real value lies. The truths for the most part are constant; still, we include some “Lessons Learned” based on the much deeper experience of Six Sigma since 1999.

Hidden Truth #1

Six Sigma encompasses a broad array of business concepts, best practices, and skills (some advanced, but a lot common sense) that are essential ingredients for making improvement and change work well. Where it has shown the most impressive and lasting results, Six Sigma *thinking* is really more important than the tools. When it is narrowly defined as “a quality program” or “a statistical approach,” the impact is sure to be limited.

Lessons Learned: Far too many organizations and training programs have continued to emphasize tools and projects and overlooked the fundamental Six Sigma dimension of *asking the right questions*. Learning tools and working on projects can only go so far, whereas asking questions and responding effectively can be applied every day.

The Payoff: By balancing the tools and projects with the proactive, creative thought processes that are core to Six Sigma, you will be able to apply it much more broadly and see the impact on not just formal problem solving, but also how people, from leaders to front-line, act and respond every day.

Hidden Truth #2

Look around and you will find many “Six Sigma Ways.” Following a fixed prescription, hiring a consultant to tell you what to do, or mimicking another organization is guaranteed to fall short or fail. You need to be guided by your own vision, goals, capabilities, and culture (or “cultures,” since most organizations are really a mix) and be prepared to learn and adapt. In addition, the Six Sigma Way is not (or should not be) about solving only certain types of problems. Because it is about thinking as much as tools, it can impact how you address many kinds of challenges.

Lessons Learned: Here, the story is much more positive than under Hidden Truth #1. Most organizations soon recognize that following a standard implementation model for Six Sigma does not work. Only those that have continued to adapt their approach over time have achieved the kinds of results they had hoped for. Persistence, it seems clear, has its rewards.

The Payoff: Building your own Six Sigma way can be a great learning experience, yielding insights into how your business works, what good and bad habits govern your actions, where the biggest opportunities for improvement lie, and how best to capitalize on those opportunities. If you are willing to continue on that Way, it is likely that the biggest benefits lie ahead of you.

Hidden Truth #3

The potential gains from Six Sigma are equally or more significant in services and nonmanufacturing activities as they are in production environments, and even greater when working *across* functions and processes.

As you will see, you cannot apply Six Sigma quite the same way in sales as in manufacturing, but the fundamentals are the same, whether it is measuring performance, finding waste, or implementing a solution.

Lessons Learned: When leaders invest time, working as a team to identify and address key cross-functional opportunities, the outcomes are nearly always positive. By contrast, when Six Sigma is run by department-focused groups that are left to generate their own projects, the outcomes are usually disappointing. One of the biggest remaining upsides of Six Sigma still lies in greater leader and organization-wide ownership; it is much more often relegated over time to a department or group that works only on special projects, having to justify its existence every year.

The Payoff: You can get more mileage from your improvement investment if you look at your opportunities broadly and take on both the cross-functional issues and local problems that have the most impact on your profits and customers. Then it can be more easily linked to what is important to everyone and be integrated into common practice.

Hidden Truth #4

Six Sigma is as much about people excellence and mindset as it is about technical capability and quality. Customer focus, creativity, collaboration, communication, commitment, and openness to change form the foundation of effective improvement, and they start with people. Fortunately, the fundamental ideas of big-picture Six Sigma can inspire and motivate better ideas and performance from people and create synergy between individual talents and technical prowess. To bring forth excellence in people, however, you have to put significant effort into engaging and enabling their contributions.

Lessons Learned: It is here that the impact of Six Sigma is difficult to gauge. So many thousands of people have been trained, examined problems and processes, and implemented improvement, but how has that really affected their ability and attitudes toward continuous improvement? Certainly plenty of people view the whole endeavor as a waste of time, but many others feel it has given them valuable skills, insights, and abilities. In some cases, it has been a life-changing experience.

The best we can conclude after talking to many of these people is that when their Six Sigma story emphasizes people and robust business excellence, the net impression is often very positive. When the

training and themes are technical and narrow, the lasting benefit is not nearly as strong.

In addition, it is clear that inherent ability in communication, connecting ideas, openness, and flexibility can have a big impact on how quickly an individual will take to Six Sigma and apply it well. Bringing these people into the effort early on can make a big difference in the success of an organizational initiative.

The Payoff: Done right, Six Sigma can help you bring out the best in people: yourself, your team, your organization. Collectively, it can and should help your culture evolve to be more responsive, less complacent, and more focused, not to mention more efficient and effective.

Hidden Truth #5

Successful improvement, which is the essence of Six Sigma, can be thrilling and rewarding, if you can unlock the talent that exists in your organization. We have seen people rave about the positive changes that have come to their organization, thanks to the new, smarter way they are running their business. We have watched executive teams abandon their decorum, as they race around trying to speed up and perfect a “broken” process in a Six Sigma workshop. In this book, we try to share some of the fun and enthusiasm we have seen and felt about Six Sigma as we describe how to make your efforts successful. (If at times our attempts at sparkling wit fall flat, we apologize in advance.)

It is a lot of work, too. Any type of Six Sigma effort takes an investment in time and money, effort and energy. Finding the right way to motivate yourself and others, whether your organization is at the top of its game or in dire straits, is one of those elusive essentials.

Lessons Learned: Rewards and recognition are valuable in getting people’s attention and promoting involvement, but they have their limits and potential unintended consequences (as in one client where first-generation Six Sigma trainees received stock options, prompting a lot of others to expect the same up-front payoff). Better, we have seen, to set a vision for change that links the practical/tangible (reducing costs, growing revenue) and the inspiring (building a great company). Then connect these goals to people’s performance expectations and measures. Improvement success becomes both a fundamental requirement *and* a cause for celebration.

The Payoff: Done right, the financial gains from Six Sigma may be exceeded in value by the intangible benefits. In fact, the changes

in attitude and enthusiasm that come from improved processes and better-informed people can be more fulfilling, emotionally, than the financial gains, though of course those are quite important, too! Strive for both, and you are much more likely to achieve your vision and goals.

Key Features of *The Six Sigma Way*

This book is designed with maximum customer satisfaction in mind. We hope that by reading it you gain a complete picture of what is behind the Six Sigma movement, how it has paid off for many organizations, and how you can implement the system so as to best fit your circumstances. Our goal is to provide a flexible resource and reference, whether you have been engaged in Six Sigma for several years or are just starting to learn and apply it.

Here are some of the features that will help you get the most out of the book:

- 1. A guide to finding just what you need.** Following this introduction, you will find an overview of each section and chapter, with tips on which pieces to use (or skip over) depending on your objectives and circumstances.
- 2. Practical implementation guidelines.** Whether it is fixing a process problem or implementing Six Sigma companywide, we review important information to help you get started and keep moving.
- 3. Insights, comments, and examples from real people.** Business leaders, experts, and managers who are using Six Sigma in their organizations share thoughts that have helped reinforce and refine our ideas; we are confident you will learn a lot from them, too.
- 4. Case studies based on real companies.** These real examples, with fictional names and details, help you see how Six Sigma can work (and has worked) in many organizations in many different industries. These case studies are set off in tinted boxes, so you can easily discern the examples from the main text.
- 5. Real-world stories of Six Sigma success and insights from companies.** These companies are as diverse as Adobe, Macy's, Starwood, and others.
- 6. Checklists for many of the essential steps in Six Sigma improvement.** We hope to prepare you to go out and do Six Sigma activities, so we map out key steps to help you make the right choices.

7. **Lists of questions to ask yourself.** Such a list can be essential when preparing for or embarking on a Six Sigma project.
8. **An introduction to advanced techniques.** This book is not meant to be a technical manual; plenty of other texts cover the nuances of process statistics and advanced experimental design. We will, however, help anyone understand what the analytical tools of Six Sigma are, why and how they are used, and when they should be applied. (But remember they are only a small part of what makes Six Sigma pay off.)
9. **Our own perspectives and advice.** In giving you a guide to Six Sigma best practices, we synthesized different viewpoints, guided by our experience and understanding of what works best, when, and how. Some of our thoughts challenge the views of Six Sigma experts; where they do, we give evidence for our perspective. Because we have worked with some of the most visible Six Sigma companies and have applied these concepts in many types of businesses, we believe our views can make Six Sigma even more powerful than it might otherwise be.

A Final Philosophical Word

Lastly, we would like to offer you a theme that we think represents one of the most important aspects of Six Sigma and hence will be key to your success in applying it to your business.

In their book *Built to Last*, James Collins and Jerry Porras provide insights into many of the most successful and admired companies of the twentieth century. The dimension that they found most remarkable among these firms is their ability and their willingness to simultaneously adopt two seemingly contrary objectives *at the same time*. Stability and renewal, big-picture and minute detail, creativity and rational analysis, these forces working together make organizations great. This we-can-do-it-all approach they call the “Genius of the And.”

You can see this genius in action in everyday business if you look closely. For example, the best managers are usually those who set broad goals and direction (big picture), yet who can still offer effective input and ask tough questions (the details). In a larger business context, an example of the “Genius of the And” would be a company’s constant attention to *both* long-term growth and quarterly results.

The opposite effect, to which lesser organizations fall victim, Collins and Porras dub the “Tyranny of the Or.” It is the paralyzing view that we can have it one way or the other, but not *both*.

Six Sigma, we believe, depends on your business learning to exhibit the Genius of the And, and it offers a way to unlock this genius in your own people and processes. Table I.1 provides some examples of those seemingly opposing ideas we encounter in this book that *in fact* are key to success.²

As you learn about the what, why, and how of Six Sigma in this book, try to remember that the success you are seeking will be based on your ability to focus on the “And” and not the “Or.” The key to unlocking the Genius of the And in you and your organization can be found in these pages. The goal of *The Six Sigma Way* is to enable you to understand *what* Six Sigma is (both a simple and a complex question), *why* it is probably the best answer to improved business performance of the past 20 to 30 years, and *how* to put it to work in the unique environment of your organization. In our mission to demystify Six Sigma for the executive and professional, we hope to show you that it is just as much about a passion for serving customers and a drive for great new ideas as it is about statistics and number-crunching; the value of Six Sigma applies just as much to marketing, service, human resources, finance, and sales as it does to manufacturing and engineering. In the end we hope to give you a clearer picture of how Six Sigma—the *system*—can dramatically raise your odds for staying successful, even as you watch other companies ride one wave of good times only to wipe out on the next. (Our first and last surfing analogy!) Let’s get started.

TABLE I.1 “GENIUS OF THE AND” EXAMPLES

We can . . .	AND we can . . .
Reduce errors to almost none	Get things done faster
Engage people in understanding and improving their processes and procedures	Maintain control of how work gets done
Measure and analyze what we do	Apply creative solutions to “push the envelope”
Make customers extremely happy	Make a lot of money

A GUIDE TO *THE SIX SIGMA WAY*

This book is organized for use by a variety of readers, from Six Sigma novices to people right in the thick of improvement efforts. Although you may prefer to read it from cover to cover, the content is organized in three parts to help you learn about Six Sigma now at just the level of depth you need. You can read the rest of the book later when you need it.

Here is a guide to the content, first by part, then by chapter.

The Major Sections

Part One: An Executive Overview of Six Sigma

For the executive or the newcomer to Six Sigma, Part One provides a thorough overview of key concepts and background including success stories, themes, measurement, improvement strategies, and the Six Sigma roadmap—a five-phase model for building the Six Sigma organization. We also look at how Six Sigma efforts can avoid some of the mistakes that hurt total quality efforts and how to apply Six Sigma in service as well as manufacturing processes or businesses.

Part Two: Gearing Up and Adapting Six Sigma to Your Organization

This section looks at the organizational challenges of launching, leading, and preparing people for the Six Sigma effort. We examine the key question of whether to start a Six Sigma effort and where to begin your effort. Here is also where you can find out about responsibilities of business leaders, Black Belts, and other roles. Finally, we explore how to choose the right improvement projects.

Part Three: Implementing Six Sigma: The Roadmap and Tools

This section focuses on the how-to of the major components and tools in the Six Sigma system. For those who want to begin doing the work of making Six Sigma gains, or just want to know more about what is really involved in the effort, this section should answer many of your questions. For example, if your concern is about measurement, you can concentrate on Chapter 14; if you are looking at redesigning a process, Chapter 16 will be your focus. We cover some of the more important advanced tools of Six Sigma in this section as well. As a conclusion, we offer a list of Twelve Keys to Success for your Six Sigma journey.

The Chapters

The following quick summary of each chapter focuses on the questions addressed in each.

Chapter 1: A Powerful Strategy for Sustained Success

How does Six Sigma apply to the business challenges of the new century? What are some of the results and successes that have brought Six Sigma to the forefront of business leadership today, including at GE, Motorola, and AlliedSignal? What are some of the key organizational benefits it offers and the themes that drive Six Sigma improvement?

Chapter 2: Key Concepts of the Six Sigma System

What kind of organizational “system” can Six Sigma create and how does it apply to short- and long-term success? What does the *measure* “Six Sigma” mean? What role do customers and defects play in measuring Six Sigma performance? What are the core improvement and management methodologies of Six Sigma? What is the DMAIC model? What really is, or should be, a Six Sigma organization?

Chapter 3: Applying Six Sigma to Service and Manufacturing

Why does Six Sigma hold as much, if not more, promise in service processes and organizations as in manufacturing? What are the keys to making Six Sigma work well and provide results in a service environment? What are the unique challenges that can arise in applying Six Sigma in manufacturing functions, and how do you address them?

Chapter 4: The Six Sigma Roadmap

What is the best sequence for implementing the core competencies of Six Sigma? What are the advantages of the ideal Six Sigma roadmap? What is the value provided by each component to a responsive, competitive organization?

Chapter 5: Is Six Sigma Right for Us Now?

What key questions should we ask to determine whether our organization is ready for and can benefit from Six Sigma? When would Six Sigma *not* be a good idea for a business? What are the cost/benefit considerations when deciding whether to embark on a Six Sigma initiative?

Chapter 6: How and Where Should We Start Our Efforts?

What options can we consider in planning our Six Sigma launch? What are the on-ramps to the Six Sigma roadmap? How do we scale our effort to meet our needs? How can we use an assessment of our strengths and weaknesses to focus our resources? Why is a piloting strategy essential, and how should it work?

Chapter 7: Leadership Actions to Launch and Guide the Effort

What are the key responsibilities for organizational leaders in guiding the effort? How do communication, demand for results, and “change marketing” impact our potential for success?

Chapter 8: Preparing Black Belts and Other Key Roles

What roles are typically needed in a Six Sigma implementation? What is a Black Belt, and what are the options for defining his/her function? How can the various roles be structured and conflicts be avoided? What are the key considerations when choosing members for team projects?

Chapter 9: Training Your Organization for Six Sigma

Does Six Sigma necessarily demand weeks and weeks of training to start? What are the keys to effective Six Sigma training? What are the common elements in a Six Sigma curriculum?

Chapter 10: The Key to Successful Improvement: Selecting the Right Six Sigma Projects

What are the key steps in choosing and setting up Six Sigma improvement projects? How do we decide which improvement model—DMAIC or some other approach—is best for our business?

Chapter 11: Identifying Core Processes and Key Customers (Roadmap Step 1)

What are core processes, and how have they become a key to understanding businesses? What are some common types of core processes, and how do you identify those in your organization? How do you identify the key customers and outputs of your core processes? What is a SIPOC model and diagram, and how can they be applied to a better understanding of our business?

Chapter 12: Defining Customer Requirements (Roadmap Step 2)

Why is having a voice of the customer (VOC) system so critical in business today? What are the key actions and challenges in strengthening your VOC system? How do we identify and specify output and service requirements of our customers? How does better understanding of customer needs link up to our strategy and priorities?

Chapter 13: Measuring Current Performance (Roadmap Step 3)

What are the basic concepts in business process measurement? What are the basic steps in implementing customer- and process-focused measures? How do you effectively carry out data collection and sampling? What types of defect and performance measures are fundamental to the Six Sigma system? How do you calculate “Sigma” for your processes?

Chapter 14: Six Sigma Process Improvement (Roadmap Step 4A)

How do you define, measure, analyze, and improve a key business process, while focusing on identifying and eliminating root causes? What are the basic tools of process improvement, and when can each

be used effectively? What are some of the key obstacles to executing a Six Sigma improvement project?

Chapter 15: Six Sigma Process Design/Redesign (Roadmap Step 4B)

How is Six Sigma process design/redesign different, and why is it a critical element in maximizing business performance? What conditions are essential to take on a process design or redesign project? How does redesign differ in execution from improvement? What special tools and challenges come into play when you are designing/redesigning a business process? How do you test and overcome assumptions that limit the value of redesigned processes?

Chapter 16: Expanding and Integrating the Six Sigma System (Roadmap Step 5)

How do you measure and solidify the gains made through Six Sigma improvement projects? What are the methods and tools of process control? What are the specific responsibilities of and considerations for a process owner? How does the evolutionary discipline of process management support the Six Sigma system and long-term improvement?

Chapter 17: Advanced Six Sigma Tools: An Overview

What are some of the most prevalent power tools of Six Sigma improvement? What role does each play in helping you to understand and improve processes and products/services? What are the basic steps to these sophisticated techniques?

Conclusion: Twelve Keys to Success

What are some of the key actions and considerations any company or leader should keep in mind to make Six Sigma pay off?