

Sustainable Quality

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Joseph Diele



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Description

Times have changed and the concept of using quality as a competitive advantage has been diminished or even lost completely. Quality only becomes a competitive advantage when it is embraced by the entire company.

It is not that there is a lack of quality improvement models. There are many available, such as: ISO, Baldrige, Total Quality Management, Lean, Six Sigma, to name a few. While all these models have been successful, why has there not been one model that takes hold as *the* model? Why do improvement efforts seem to fizzle out? Why are they not sustainable? Why are continuous improvement efforts not continuous?

Something has been missing from the strategy, planning, and implementation of these quality efforts. That missing ingredient has been culture.

This book lays out both a strategy and the practical tools and methods needed for sustainable quality, without comprising on either. The book presents a new quality model. This new model explains why building a positive culture is a prerequisite to real quality improvement. Building on a strong culture, the book shows how to develop the right tools, methods, and training to keep everyone engaged.

Transformation requires a clear and inspiring vision. However, the way people react to any change has everything to do with the culture and environment they are working in. Continuous improvement means change. Change happens through people. All the best tools and training will not be successful (especially over the long term) if a true culture of quality has not been established first.

Keywords

quality; sustainable quality; leadership; culture; cost of quality; continuous improvement; functional quality; TQM; change management; quality strategy; profitability; process; data analysis; data-based decisions; teams; new quality model

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Foreword

I met Joe Diele about 26 years ago at StorageTek, a data storage company, founded in 1969 and later acquired by Oracle, with a focus on large-scale tape libraries. I was a director building a new development organization, and I needed to ensure quality and reliability from the earliest stages of defining the product architectures and designs. I had heard about this engineer that was touted as one of the best reliability and quality engineers in the company, and so I did what any good director would do and recruited Joe to join our team. Joe more than lived up to the amazing reputation he had built at StorageTek and recruiting him was truly one of the smartest things I've done. Joe exuded passion and ability unlike any quality engineer I had ever met, and with his help, we implemented some of the best quality processes I've ever had the privilege of being associated with.

Why is quality important? When you have created a culture of quality, you will bring functional products to market faster, you will achieve greater customer satisfaction and market penetration, you will enjoy improved profitability as a result of reducing your non-conformance costs, and you will improve employee job satisfaction by creating a culture of excellence. Quality cannot be an afterthought—it must become part of the team culture through cultivated intentional practice. That is what makes this book *Sustainable Quality* a must-have for any development or quality assurance team member or manager. And that is why I was honored when Joe asked me to write this foreword for his book. It will help you to achieve a new level of success.

I can assure you this book *Sustainable Quality* will become one of your most valued “go to” books. You will find no shortage of books that speak to tools, technologies, and processes to track quality metrics and administer quality tasks. What makes this book unique and powerful is its focus on how to bring a culture of quality and excellence into your company. It has been my experience, all the greatest tools and methods will not matter if you don't have a culture that embraces quality, change and a real

dedication to improvement. Make no mistake this will be one of the key challenges you will have. Joe has done a good job throughout the book, addressing key factors to help you influence what a healthy culture can and should look like in preparation of establishing a culture of sustainable quality. The question is, what are you going to do with that information? By embracing the value of continuous improvement, quality and excellence, you will take your team and company to new heights of success. But engagement requires commitment. As the leader, that commitment you must start with you.

—Fred Casanova

Preface

Working in Quality my entire career, I have had the opportunity to see firsthand what the impact can be when successfully implemented. Not only within the companies I have worked at. This also includes companies I have worked with closely, such as suppliers, partners, customers, and even some competitors. Being successful with quality, and more importantly sustaining that level of quality, is easier said than done. It is my belief, that culture is the critical factor in whether quality efforts fizzle out or truly achieve continuous improvement. In fact, culture is a critical factor for any business success.

Much has been written about culture and how it can make or break a company. Yet so many companies today are either unaware or unwilling to create the type of culture that elevates their business. When your business is dealing with high absenteeism or, worse, high turnover, it should be no surprise that you are also dealing with a high cost of poor quality. You might not recognize it as a quality cost, but you are likely struggling with excessive waste, low productivity, and repeated mistakes.

The intent of this book is not to be a technical book on statistics and quality control. This is really a book about management for the future, with the sole purpose of raising your business to a whole new level. And by new level, I am specifically talking about being more profitable. It is my strong belief, and thus the reason for writing this book, that a better understanding and appreciation of quality and its direct correlation to culture will help you achieve that.

This book will not give you a step-by-step procedure on how to get there. The truth is nobody can provide that to you. Every company is different, each with its own set of issues and needs. This book is more about creating awareness of what real quality looks like. It is not a test team checking a product for defects, or inspector sorting good products from bad or a support team handling a customer complaint. It is about evolving beyond those types of activities. I am hopeful that you will get a

better view, a more wholistic view, of how quality can influence your suppliers, thrill your customers, and save you time and money along the way.

We will touch on many areas within a typical business, with thoughts and suggestions about how each area can be improved. But make no mistake. The real value, the actual payoff, comes from putting all the pieces together and cashing in on the synergistic impact of quality that can only be realized collectively across the entire business, fueled by a culture that embraces continuous improvement.

Acknowledgments

While I have been fortunate in my career to have worked with and for some exceptional people, there have been three managers that had a dramatic impact on my career and life in general. Their guidance and support are very much appreciated.

Joe Lovato showed me early in my career that leading people was more effective than directing people. It was his mentorship that put my career on a course toward constantly examining how I could become a better leader.

Bob Wood always had such great insight on business, products, and processes. He is exceptional at getting you to think and look at things differently. He could talk in depth across a range of subjects like nobody I have ever met. I have always enjoyed each opportunity to visit with Bob and I know that I always walked away a little smarter after talking with him.

Fred Casanova pulled me out of thinking day-to-day and encouraged me to be more creative, take chances, and build visions. Then he would back me up and support me 100 percent of the time. Fred taught all of us that worked for him that it was ok to have fun at work. He would set a high bar but then lead by example. Fred had a true gift for leading people. He would genuinely create the feeling that you were missing out if you did not follow. To say that we went through some challenging times together would be an understatement. However, I could not think of anyone I would rather be side by side with than Fred.

I am so blessed to have three beautiful daughters, Angel, Talia, and Jonina. I am so proud of each of you, for what you have already achieved and know that you are just getting started. You each inspire me to always do the right thing and set the right example. You are the joys of my life.

To my amazing wife, Tammy. You changed my life the day I met you and have given it meaning every day since. You simply make me a better man.

CHAPTER 1

Introduction

The Impact of Quality

Quality Saves Money

What if, with relative minimal investment, your company was able to save between 20 and 30 cents of every dollar it earns or increase revenues or market share by like proportions? This isn't a rhetorical question; rather what is attainable if one improves the quality of the product or service they deliver. By eliminating poor quality and increasing good quality, companies save money and improve their bottom line.

How much could you save if you did *everything* "right the first time"? If you *knew* that everything was done right, you would not need to spend time (and money) on: inspecting, re-inspecting, design changes, bug fixes, testing, retesting, reworking, scrap, troubleshooting problems. You also would not need dedicated staff that deals with irate customers, complaints about poor service, product issues, or incur all the costs associated with returned products or service calls.

It is not unusual for companies that do not measure their cost of poor quality (COPQ), to be spending as much as 30 percent of sales on poor quality activities. That means that one and one-half days per week, you are redoing work that was not done right the first time. How much could you save if you cut that down to one day per week? How about four hours per week? Or, one hour per week?

We will discuss cost of quality (COQ) and cost of poor quality (COPQ) in more detail later in the book. For now, you should know that quality costs are split into four categories: prevention, appraisal, internal failures, and external failures.

An example may help put this into perspective. Let's say a business made \$30 million in revenues last year. If their COPQ was really at 30 percent, they would be spending \$9,000,000 per year or \$750,000 per month to do things over. If you reduced the COPQ from 30 percent down to 20 percent, they would be *saving* \$3,000,000 per year or \$250,000 per month. Ideally, you would like to have COPQ down below 10 percent.

Let's explain that 30 percent a bit further. The 30 percent attributed to poor quality would be divided between internal failures and external failures. For a typical technology company, this might include costs such as the following:

Internal Failure Costs

- Time spent on failure analysis of failed products resulting from internal testing, including engineering and manufacturing tests
- Scrap and rework of products that failed internal testing
- Engineering changes due to internal test failures
- Retesting of product that was previously tested.

External Failure Costs

- Support costs due to a customer failure
- Cost of product(s) returned due to a customer failure
- Failure analysis of customer issue
- Engineering changes due to a customer failure
- The logistics costs of sending replacement product and returning failed product
- Lost or deferred sales due to customer frustration.

While making improvements for these types of issues are not easy, they are possible. And, who does not want to reduce costs and improve margins? For some businesses, saving time is more important than saving money. Doing things right the first time is always faster than doing things over.

What Is Quality?

What exactly is quality? Dictionary.com defines quality as “an essential or distinctive characteristic, property, or attribute.”

What has always fascinated me about quality is that most of these key principles can be used across any industry (e.g., technology, health care, government, restaurants, large corporations, and small businesses). These principles are very transferable. While there are industry differences, in terms of regulations, standards, and certainly products and services, most quality best practices can be adapted (with some minor customization) to any business.

There are many definitions of quality. Some are very specific like the definitions from three of the most well-known quality experts.

W. Edwards Deming:¹ Never-ending improvement of the extended process for which management is responsible.

Joseph Juran:² Quality is fitness for use.

Philip Crosby:³ Quality is conformance to requirements.

The definition of quality is often in the eye of the beholder. A simplistic view of quality may be that it provides a level of awareness for how good or bad a product or service is, whether measurable or not.

I would define quality as meeting the customer’s expectation. Although a simple definition, it needs to be unpacked to be fully understood. Meeting customer’s expectations means not only do you know what they need, but also know what they expect (not always the same thing). It means you have the structure, controls, and resources in place to ensure those expectations are consistently met. Furthermore, I believe there is an essence of quality, an inward nature, that is equally important, if you want quality to be sustainable. I think of this intrinsic nature of quality as a continuum of pride and perfection. Therefore, even when it is not perfect, you are driven, based on pride, toward continued improvement. You continue along that continuum to make it better as you strive for perfection.

¹ Gitlow and Gitlow (1987).

² Juran (1951).

³ Crosby (1979).

When you are deeply committed to what you are doing and who you are doing it for, you have that inner determination to build your product or service to the absolute best of your ability. That happens when you are working in an inspiring and supportive environment. It is more about the people doing the work and how much of their heart and soul they put into the final outcome. The outcome can be a completed product or a set of completed steps that then gets passed on to the next person to add their own contribution toward a completed product or service.

For technology companies, quality can be used as a benchmark to compare similar products or services. When I worked at Fusion-io, we had developed the first enterprise level solid state storage (SSD) device. As the newcomer to enterprise storage, we had to compete against the large industry leaders that had a long history of selling hard drives (spinning disk) for enterprise storage. Because it was a new technology, our messaging about the quality and reliability of SSD became a critical success factor. Fusion-io went on to be highly successful in the enterprise space, in no small part because that messaging got through.

There is often this notion that quality adds cost to a product or to a company. The truth of the matter is that it depends. If you are consistently having to repeat work that was previously done because it was not correct the first time, then improving quality is an added cost. If you do not have enough trust in your people and processes such that you need to add a screen that searches for defects (inspecting or testing), those appraisal costs do add up. However, if you shift your focus toward preventing defects before they happen, you are avoiding the costs and time associated with reacting to failures and most likely reducing the time and costs associated with searching for defects.

Product and Process Quality

There are two considerations when discussing quality improvement. There is product quality and process quality.

Product Quality

Product quality is the level of outgoing quality delivered from your process. Said another way, it is what your customer expects to see. Considerations

for product quality include the emphasis on quality in your design, the verification and validation, manufacturing, and final packaging. Product quality emphasizes the level of outgoing quality to ensure it meets the expectations of your customers. Does the final product comply with the stated requirements, specifications, and regulations? Is it a product or service your customers want?

Process Quality

Process quality is the level of consistency built into the steps and tasks associated with creating, building, testing, and shipping your final product. It is about repeatability. Considerations for process quality include instructions, procedures, and metrics for the key tasks, such as requirements analysis, design activities, test activities, supply chain and logistics activities, and support activities. Process quality is focused on the efficiency and effectiveness of getting these tasks completed consistently. You want to understand what the variance is in your key processes how you can reduce it. Variance can be introduced in a number of ways, such as differences in people, tools, or parts. What are your key processes? Are they repeatable? Are there measurements in place? Does everyone involved understand their role and deliverables?

Both product and process quality are important when you are looking at quality improvement. You cannot focus on one without the other. The approach to each is slightly different. We will discuss these further in later chapters.

Quality Improves Profitability

There are two primary ways to improve profitability: (1) increase sales and (2) improve margins, shown in Figure 1.1. Better quality can certainly lead to increased sales, through enhanced customer satisfaction, making more competitive products, and increased name recognition. But quality has a direct impact on margins that can be measured. This includes: (1) reducing costs with more efficient processes and more reliable products and (2) increasing value by removing waste and doing things right the first time.

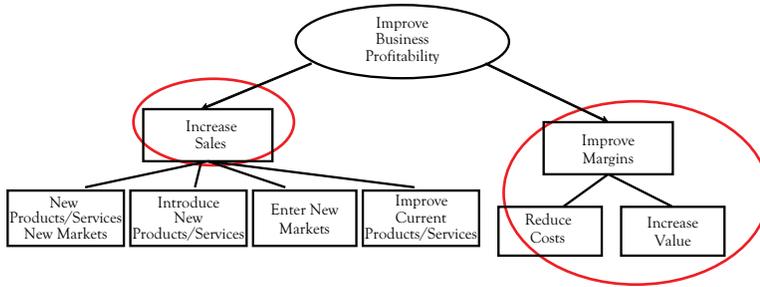


Figure 1.1 *Improve business profitability*

Increase Sales

Improve Quality to Increase Value

Think about building quality into your designs, which means designing the right product at the right time at the right price. Juran called this quality by design (QbD). Or use the voice of the customer (VOC) to convert customer feedback into requirements. Really understand what value you are providing.

Value goes beyond feature and function. Make their ordering process easy and simple. Reduce their wait time. Make access to your products and services convenient. Make all interactions with your customers hassle-free and painless.

Map out your customer interactions for inquiries, orders, returns, and complaints. Identify possible points of delay or frustration and eliminate them.

Improve Quality to Increase Market Share

The Ansoff product/market growth matrix,⁴ shown in Figure 1.2, is a planning tool used to analyze and generate four alternative directions for the strategic development of a business or corporation. Using quality as your differentiator, you can strategically position your product into the four quadrants.

⁴ Spencer (2013).

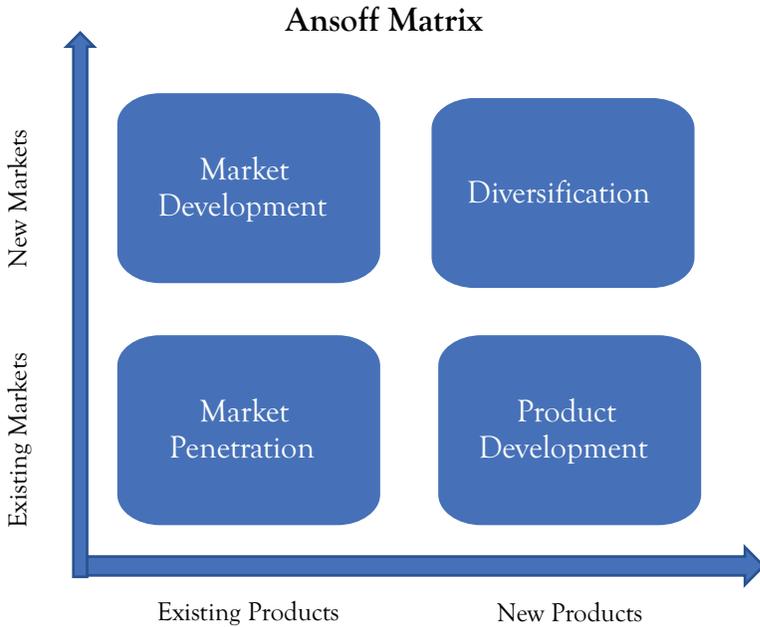


Figure 1.2 Ansoff matrix

The four strategies of the Ansoff matrix are as follows:

1. *Market penetration*: The focus is on increasing sales of existing products to an existing market.
2. *Market development*: The focus is on entering a new market using existing products.
3. *Product development*: The focus is on introducing new products to an existing market.
4. *Diversification*: The focus is on entering a new market with the introduction of new products.

Of the four strategies, market penetration is the least risky while diversification has the most risk.

Market Penetration

In market penetration strategy, the organization tries to grow using its existing offerings (products and services) in existing markets. Specifically,

it tries to increase its current market share in its current market. This can be achieved by selling more products or services to established customers or by finding new customers within current markets. Typically, the company pursues increased sales for its present products in its present markets through more aggressive promotion and distribution. This strategy works in a growing market, where simply maintaining market share will result in growth.

Market penetration can be accomplished by:

- Price decrease
- Increase in promotion and distribution support
- Minor product refinements

From a quality perspective:

- Reducing waste and the cost of poor quality allows you to lower price
- Building a reputation for high quality will help in promotional activities
- Understanding the voice of the customer (VOC) will help identify product enhancements that attract more customers.

Market Development

In a market development strategy, the company tries to expand into new markets (geographies, countries) using its existing offerings with minimal product/services development. This strategy is more likely to be successful when

- the firm has a unique product technology it can leverage in the new market;
- it benefits from economies of scale if it increases output;
- the new market is not too different from the one it has experience of; and
- the buyers in the market are intrinsically profitable.

This can be accomplished by identifying different customer segments:

- (a) Selling in different geographical areas (new countries/regions)
- (b) Selling through different sales channels (e.g., online)
- (c) Selling to different demographic groups (e.g., by age or gender)

Options (a), (b), and (c) may be entirely new to the company and this poses a risk. However, if the company holds a large market share for the specific product type, or has strong brand recognition, or a strong brand range, then this strategy could work in its favor.

From a quality perspective:

Different countries/regions may have different requirements (e.g., certifications, laws). Well-defined requirements are essential to eliminate surprises that can derail a launch.

Collaboration with new channels and groups will require well-defined processes and procedures, as well as clear roles and responsibilities to ensure all involved are aligned.

Product Development

In product development strategy, a company tries to create new products and services targeted at its existing markets to achieve growth. This involves extending the range of products available to the company's existing markets. This may be a good strategy for a company that already has a strong market share of a specific market and wishes to diversify its product range. However, it would need strong research and development capability.

These products may be developed by:

- additional investment in research and development;
- acquisition of rights to produce someone else's product;
- buying someone else's product and rebranding as your own;
and
- joint development with ownership of another company who need access to the firm's distribution channels or brands.

From a quality perspective:

- Developing and acquiring new products will require a solid understanding of the voice of the customer (VOC).
- When buying or having someone produce a product for you, your requirements need to be clearly defined. Don't just focus on features and functions. Define your standards for quality and reliability as well.

Diversification

In diversification, an organization tries to grow its market share by introducing new offerings into new markets. This strategy has the most risk because both product and market development is required. It is best to use this strategy when it can be a supplement to the existing core business. The diversification can be organic but often happens from the result of an acquisition or merger.

Beyond the opportunity to expand your business, the main advantage of diversification is when one business might suffer from adverse circumstances, another may not be affected.

From a quality perspective, diversification makes quality improvement more complex. It becomes more about insisting on the right culture and standards of quality as you grow through acquisitions, partnerships, and expanding your own workforce.

Improve Margins

One way to improve margins is to reduce costs. An effective way to reduce costs is to utilize the Lean principles that focus on eliminating waste. Lean is a set of principles and tools that was developed by Toyota in 1988. We will dive deeper into Lean and reducing costs in later chapters. But for now, here are the eight types of waste identified in Lean principles. To help improve margins, you should look for opportunities to reduce waste (which saves time and money) by focusing on these eight areas.

1. *Defects*. Products or services that do not meet specification and require additional resources to correct.
2. *Overproduction*. Producing too much of a product before it is actually needed.
3. *Waiting*. Time spent waiting for the previous step in the process to complete.
4. *Nonutilized Talent*. Employees that are not effectively used or under-utilized in the process.
5. *Transportation*. Transporting items or information that is not required to perform the process from one location to another.
6. *Inventory*. Inventory or information that is sitting idle (not being processed).
7. *Motion*. People, information, or equipment making unnecessary motion due to workspace layout, ergonomic issues, or searching for misplaced items.
8. *Extra Processing*. Performing any activity that is not necessary to produce a functioning product or service.

Where Has Total Quality Gone?

Today the emphasis on quality is just not as strong as it once was. Having worked in quality for many years, I always find it interesting when talking to friends, family, and new acquaintances in casual gatherings. If you tell someone you work in finance, engineering, sales, hospitality, or nursing, they immediately have a general idea of what you do. But if you tell someone you work in quality, you usually get a response like, “Hmm, ok. So, what exactly do you do?” Classes on quality are not a typical option in most curriculums. That is not to say there are not quality classes available, but you’ll need to do some searching to find them. Quality is just not a typical career path that most college students think about.

All companies say they want quality. But most companies just do not understand that everything you do has an impact on quality, either positively or negatively. To fully recognize the impact quality can have, it needs to be taught or coached into every company function and every person within those functions. Today, any knowledge of companywide

quality is passed down on the job from one generation to the next, at least at companies that understand its value. With this in mind, a brief historical view of quality might establish some context for the following chapters.

During the first international quality management conference in 1969, Armand Feigenbaum would first use the phrase *Total Quality Management* (TQM).⁵ Kaoru Ishikawa would later indicate during the conference that TQM should apply to all employees within the organization—from the workers to the head management.

In the United States, quality really came to the forefront through work and teachings of Joseph Juran and W. Edwards Deming in the 1970s and 1980s. It is hard to mention Juran and Deming without mentioning their mentor, Walter Shewhart. Shewhart was a leader in the quality movement during the first half of the twentieth century. His mentoring of engineers at Western Electric and his groundbreaking work with control charts arguably led the quality revolution and launched the quality profession. He developed the often-used improvement cycle Plan-Do-Check-Act (PDCA), also known as the Shewhart cycle.

The modern quality revolution began in the 1970s, when the quality of Japanese goods surpassed those of the United States and Europe. The United States had to change to stop the imbalance and began to place a big emphasis on quality improvement in the 1980s.

In the 1980s, the Western culture had taken notice of Japan's success and started to set and adhere to higher TQM guidelines, with an emphasis on "companywide quality," as opposed to just quality in manufacturing.

Also, during this time, Philip Crosby released his first book *Quality Is Free*. He made popular the concepts, "cost of quality," "zero defects," and "do it right the first time."

Around this time, TQM changed the game. TQM was a big shift from inspectors at the end of the production line inspecting finished products for defects. TQM essentially made the case, from the lessons of the previously mentioned quality gurus, that quality is a companywide

⁵ Alansohn, et al. (2012).

responsibility. It is not the sole responsibility of the quality department to “find” defects.

Early in my career as a quality engineer, I worked at StorageTek, a large data storage company in Louisville, Colorado. In the late 1980s and early 1990s, StorageTek started their TQM journey. They called this effort Excellence Through Quality (ETQ)⁶ and it was a companywide effort. There was plenty of messaging, planning, and training across all divisions and at all levels of management. As part of the quality organization, I was fortunate enough to be part of the early training sessions, then be involved with the implementation across different product lines, and eventually became part of the team that taught the training. Over the five years while focused on ETQ, revenues improved by 38 percent, revenue per employee went up by 27 percent, and external cost of quality went down from 31 percent to 5 percent. Additionally, StorageTek launched three of their most successful products, including their first automated tape library, their high availability disk array (known as Iceberg), and their virtual storage manager (VSM). The practices and methods taught through ETQ helped make that possible.

TQM provided a good framework for continuous improvement in the late 1980s and early 1990s. But companywide improvement efforts began to fizzle out, due in large part to a fading commitment from the top management.

Organizations such as the International Organization for Standardization (known as ISO) developed standards to further refine and provide a framework for consistent quality management systems. This includes the ISO 9000 Quality Management family of standards. But these are more about structure and consistency than improvement.

More recently, methodologies such as Six Sigma and Lean concepts have become more popular. Six Sigma and Lean concepts can drive significant improvements, although they do not have the same holistic view as did TQM.

Another change in recent years is the function now called QA (quality assurance). During the TQM era, QA meant assurance of quality for all

⁶ Stratton (1994).

aspects of quality for a product. Today, QA is most often seen in product-based companies (hardware and software). In these companies, QA is essentially a test function. This is reminiscent of the pre-TQM days where inspectors were stationed at the end of the production line to check the product/assembly for defects. During the TQM days, most companies moved away from “inspecting the quality in” and held those that built the product responsible for building it correctly. The original TQM quality initiative that drove quality responsibilities across all functional groups is slowly disappearing. Today, many companies only have a QA team that is testing for defects. I realize test is an important function and we will discuss this in more detail in a later chapter. But here are my issues with this mindset. First, if you are using QA (i.e., test) as your *only* quality function, it is like beefing up one link in your chain instead of beefing up the whole chain. Second, by having QA be responsible for quality, you are letting the developers off the hook. *Preventing* defects is much more effective and productive than *searching* for them. For quality to have the type of impact described in the opening paragraph, these types of improvements must be made companywide, across all the functions.

A Note on Quality as It Pertains to Inspection and Test

For new products or new processes, you may need to set up some level of inspection and test to help ensure defects are caught before going on the next station or going to customers. But for any type of appraisal function (inspection or test), you should always consider it as a *temporary screen*. Your ultimate goal should be to eventually do away with that function. You do that by measuring the process, analyzing (to root cause) all the defects found at that step, and fixing them. You continue to measure, analyze, and fix until the process is so robust you no longer need to inspect or test.

There are many notable contributors to the discipline of quality, with each making their own impact toward the improvement of businesses. But three of the most well-known quality gurus are Juran, Deming, and Crosby. Below is a brief background of these notable quality experts.

Juran⁷

Joseph Juran was an engineer and a management consultant. After World War II, Juran became a professor of industrial engineering at New York University, teaching quality control. Dr. Juran's work in the field of quality management drew interest in Japan, and in 1954 he went there to discuss his theories at the invitation of the Japanese Union of Scientists and Engineers. He continued teaching his quality management techniques, which became firmly embedded in the Japan's engineering and manufacturing industries. In 1979, Juran founded the Juran Institute. He published several books, most notably the *Quality Control Handbook*.

The Juran Trilogy

1. *Quality Planning*. Quality planning refers to the process of preparing to achieve quality. Planning is done to meet objectives. Clear objectives are needed before starting the plan. Quality planning is the activity of developing the products and processes required to meet customer's needs.
2. *Quality Control*. Quality control consists of evaluating the actual quality performance, comparing it the actual performance to quality goals, and acting on the difference.
3. *Quality Improvement*. This process is the means of raising quality performance to new levels ("breakthrough"). His methodology consists of a series of structured steps.

Deming⁸

W. Edwards Deming was a business consultant and statistician. He and Juran are considered the fathers of the modern quality movement. After World War II, he was invited to work in Japan, where he greatly influenced Japanese industry, specifically in Statistical Process Control (SPC)

⁷ Juran (1951).

⁸ Gitlow and Gitlow (1987).

and Total Quality Management (TQM). In 1982, he published his book *Out of the Crisis*. In this book, he published his 14 points for delivering quality products.

The 14 Points

1. *Create a constant purpose toward improvement.* This is building a plan for quality in the long term and resist reacting with short-term solutions. Don't settle for doing the same things better—find better things to do.
2. *Adopt the new philosophy.* This speaks to sharing the responsibility for quality throughout the organization. Create your quality vision and implement it.
3. *Stop depending on inspections.* You can't inspect quality into a product (same goes for test). Inspections are costly and unreliable—and they don't improve quality, they merely find a lack of quality. Build quality into the process from start to finish.
4. *Use a single supplier for any one item.* Deming believed that quality relies on consistency—the less variation you have in the input, the less variation you'll have in the output. Look at suppliers as your partners in quality.
5. *Improve constantly and forever.* Continuously improve your systems and processes. Deming promoted the Plan-Do-Check-Act approach to process analysis and improvement.
6. *Use training on the job.* Train for consistency to help reduce variation. Build a foundation of common knowledge. Encourage employees to learn from one another and provide a culture and environment for effective teamwork.
7. *Implement leadership.* Expect your management team to understand their workers and the processes they use. Don't just supervise—provide the support and resources needed so each employee can do his or her best.
8. *Eliminate fear.* Allow people to perform at their best by creating an environment where they're not afraid to express ideas or concerns. Ensure that your leaders are approachable and that they work with

teams to act in the company's best interests. Use open and honest communication to remove fear from the organization.

9. *Break down barriers between departments.* Create a shared vision and use cross-functional teamwork to build understanding and reduce confrontational relationships. Focus on collaboration instead of compromise.
10. *Get rid of unclear slogans.* Let people know exactly what you want—don't make them guess.
11. *Eliminate management by objectives.* Eliminate quotas and targets and understand how the process is carried out. Deming said that production targets encourage high output and low quality. Measure the process rather than the people behind the process.
12. *Remove barriers to pride of workmanship.* This again points to the importance of culture. Allow everyone to take pride in their work without being rated or compared.
13. *Implement education and self-improvement.* Encourage people to learn new skills to prepare for future changes and challenges. Build skills to make your workforce more adaptable to change, and better able to find and achieve improvements.
14. *Make "transformation" everyone's job.* It takes buy-in from everyone to make a transformation. Again, this talks to a shared vision to everyone can relate to and everyone understands their part in making the change.

Crosby⁹

Philip Crosby was a leading quality professional, consultant, and author. He is widely recognized for promoting the concept of "zero defects" and "cost of quality." In 1979, he founded Philip Crosby Associates, Inc. (PCA), teaching management how to establish a preventive culture to get things done right the first time. Crosby's first book, *Quality Is Free*, was credited with playing a large part in beginning the quality revolution in the United States and Europe. In this book, he listed his 14 steps to improvement.

⁹ Crosby (1979).

The 14 Steps to Quality Improvement

Step 1—Management Commitment. For change to happen, there needs to be commitment from the top that is communicated across the organization. Crosby said, “Do not confuse ‘communication’ with ‘motivation.’ The results of communication are real and long-lasting; the results of motivation are shallow and short-lived.”

Step 2—Quality Improvement Team. Bring together representatives of each department to form the quality improvement team. These should be people who can speak for their departments to commit operations to actions.

Step 3—Quality Measurement. Quality measurements for each area of activity must be established where they don’t exist and reviewed where they do. Formalizing the company measurement system strengthens the other functions and ensures proper measurement.

Step 4—Cost of Quality Evaluation. Initial measurement estimates are likely to be shaky (although low), and so it is necessary at this point to get more accurate figures. Cost of quality (COQ) is not an absolute performance measurement; it is an indication of where corrective action will be profitable for a company. Much more on COQ in later chapters.

Step 5—Quality Awareness. This is the step where you show employees the data of what “non-quality” is costing. This is an important step in that it puts a number (even if it’s an estimate) on what lack of quality can cost a company. By using cost of quality as the measurement, you prioritize your efforts by where it’s costing you the most.

Step 6—Corrective Action. As quality awareness grows and employees pay attention to the costs associated with non-quality, or the cost of poor quality (COPQ), the opportunities for effective corrective action will become more and more evident. This will start the habit of identifying and correcting problems.

Step 7—Establish an Ad Hoc Committee for the Zero Defects Program. Crosby made zero defects the standard for quality. He suggested you select three or four members of the improvement team to investigate the zero defects concept and ways to implement the program. Its purpose is to communicate to all employees the literal meaning of the words “zero

defects” and the thought that everyone should do things right the first time.

Step 8—Supervisor Training. Conduct a formal orientation with all levels of management prior to implementation of all the steps. All managers must understand each step well enough to explain it to their people.

Step 9—Zero Defects Day. Establishment of zero defects as the performance standard of the company should be done in one day. That way, everyone understands it the same way.

Step 10—Goal Setting. During meetings with employees, each manager requests they establish the goals they would like to strive for. Usually, there should be 30-, 60-, and 90-day goals.

Step 11—Error Cause Removal. Ask individuals to describe any problem that keeps them from performing error free work on a simple, one-page form.

Step 12—Recognition. Establish award programs to recognize those who meet their goals or perform outstanding acts. Genuine recognition of performance is something people really appreciate.

Step 13—Quality Councils. Bring the quality professionals and team chairpersons together regularly to communicate with each other and determine actions necessary to upgrade and improve the solid quality program being installed.

Step 14—Do It Over Again. The typical program takes a year to eighteen months. By that time, turnover and changing situations will have wiped out most of the education effort. Therefore, it is necessary to set up a new team of representatives and begin again.

Guru Summary

The philosophies of Juran, Deming, and Crosby varied across topics from slightly different to complete disagreement. However, the areas where they were aligned across their improvement strategies were goals, measurement, culture, and training.

Goals. For any type of improvement, it is important to set a target. Where do you want to be? What do you want to accomplish?

Measurement. How do you know when you have reached your goals? You need to establish some type of measurement system to determine whether you are on track or if adjustments need to be made.

Culture. You cannot expect improvement to take place in a poor or toxic culture. Employees need to feel safe and motivated to do their best.

Training. Once your plan is in place, you will need consistent communication and teach everyone how to implement your system.

We will talk discuss each of these areas in more depth when we get to the new quality model.

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