SIX-SIGMA QUALITY IN SMALL BUSINESSES:

A GENESIS FOR GROWTH

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ABSTRACT

Six-sigma quality has become a common term for describing a production process of extremely robust quality; one that has very low variability compared with the tolerance limits specified for the product being manufactured. In addition to ensuring dependable quality, such a process also makes efficient use of resources and eliminates waste. Although it is commonly associated with large scale production systems, six-sigma quality is also a metaphor for excellence in managerial thought. In this paper, we discuss this metaphor from the viewpoint of small but growing businesses, and argue that six-sigma way of thinking is not a luxury for a small business, but rather, a genesis for growth. This argument brings forth the importance of taking a systems view of a business regardless of its size, products, or services.

INTRODUCTION

The United States Small Business Administration (SBA) defines any business that has between 1 and 499 employees as a small business. Although exact numbers are elusive, SBA statistics show that there are approximately 25 million small businesses in the United States. They represent a dynamic segment of the economy where many new businesses are born each year, and many cease to exist. This segment creates virtually all of the net new jobs each year, employs more than half of the private workforce, represents 99.7 percent of all employers, provides 55 percent of all innovations, and accounts for more than half of the private sector output (see http://www.sba.gov).

A new business is born to offer something that did not exist before, be it a new service or product, lower cost, better quality, just about anything to fit a niche. The business could be as ordinary as a new neighborhood grocery store, an auto repair shop, a dental practice, a house painting business, or as exotic as a high-technology product or service resulting from many years of development. While the novelty of its products or services are often critical to get a business off the ground, it cannot survive long without meeting the demands and expectations of its customers, that is, without achieving "perceived quality" (Garvin, 1988). Thus, quality is of paramount importance for the

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survival of a business, and this is keenly recognized by many small business owners. This is illustrated by the excerpts in Table 1 which are taken from the best business tips provided by recent winners of the SBA outstanding business owner awards (see http://www.sba.gov/advice.html and http://smallbusinesssuccess.sba.gov/best.html).

It will be observed that each comment in Table 1 has a direct connection to quality, and a content analysis of all tips shows that quality is one of the main themes woven into the success stories. In summary, quality is perceived to be an important factor in the survival and growth of a business (Ehresman, 1995).

In the 1980s, the business climate in the United States was swept by a quality revolution. On the heels of that revolution came the term "six-sigma quality," which became well-known after the highly successful quality improvement efforts at Motorola Inc.. This new term was used to describe manufacturing processes of highly *robust* quality, that is, product quality characteristics exhibiting extremely low variability compared with the tolerance limits for the product. It was realized that the development of this capability would ensure both dependable quality ***and*** the efficiency of the manufacturing processes. With a real example at Motorola, this idea has led other large companies to undertake similar efforts.

The objective of this paper is to discuss six sigma as a concept which is applicable not only in large organizations, but small, growing ones as well. Here, we use six-sigma as a metaphor for excellence-oriented management thought rather than the specific details of its use in particular processes. Even without the technical details, we argue, six-sigma thinking is a useful concept for robust management; one that is able to confront the challenges of a highly competitive environment. These challenges include the rapid spread of technology, immediate and worldwide accessibility information, growth of electronic commerce, and the continual downward pressure on prices and profit margins.

In the next section, we begin our discussion with a brief summary of the basic idea of six-sigma quality. We then turn to the question of whether six-sigma quality is a luxury or a necessity in the growth of a small business. This question is relevant because attainment of very high quality requires managerial commitment as well as the commitment of scarce resources at the outset. We then describe a managerial pathway toward the adoption of six-sigma quality thinking in small businesses. Our conclusion is that six-sigma quality thinking is not a luxury for a small business, but a genesis for its growth and long-term survival.

WHAT IS SIX-SIGMA QUALITY THINKING?

The term sigma, borrowed from statistics, is a measure indicating the "typical deviation" from the average of a measured characteristic. A six-sigma process has very low variability compared with the tolerance limits established for a measured quality characteristic, as illustrated in Figure 1. The bell-shaped curve in the middle represents the variability in the measured characteristic, with its mean located exactly at the center of the tolerance range. Relative to the tolerance range, variation in the quality characteristic is so small that, even if the process mean varies up or down by as much as 1.5 standard deviations (dotted curves in Figure 1), no more than 3.4 per million items

Table 1. Excerpts from the best business tip provided by SBA small business winners.

"Trust your own talents/instincts, and surround yourself with good people."

"Hire the very best professionals you can find, i.e., CPA. Lawyer, computer consultant, whatever.

"If one's guiding light is simply doing what you say you are going to do 'at all costs and whatever it takes' you will not be surprised at the end of the day when your accounts/customers/clients reward you with the realizations of your expectations."

"Take the time to listen to people. Thank people and care about them."

"Important as it is to choose the right business, create the right strategy and develop the appropriate support systems, it is even more paramount to get the right people and liberate them to perform at their full potential."

"Quality goods and service is the most important part of business."

"Follow up and make sure it is being done, whatever IT is."

"Treat your customers and employees the way you want to be treated."

"ALWAYS remember the customer first, even if financially it may not be the wisest."

"Do not put profits before customer and employee relations."

"A successful business is based upon all people within the organization working towards a common goal."

"Give your customers what they want, not what you want them to have."

"Identify and document your core competence. Ensure each employee understands your core competence."

"Have excellent staff and give them the freedom to do their job."

"From the beginning to end, do it right; otherwise all your efforts will be worthless."

"If you don't inspect it, don't expect it."

"Build your business on a solid foundation of customer focus and employee esprit de corps. Always respect your customers' freedom of choice and value their loyalty above all else."

"Keep the quality of your product and your relationships high. People respond well to something that is well made, well designed ... and to being treated with respect."

"Find the best people for the job and compensate them well."

"Surround yourself with the best people you can find."

"Employees are the key to making your business successful, yet they are also the most expensive. So choose them wisely, and then treat them with respect and caring."

"Never become arrogant. You can always improve upon the quality of service you provide to your customers."

"Build in quality from day one. Make a commitment to continuous improvement and respect for others."

would fall outside the tolerance limits. If the process average is maintained exactly at the center (solid curve in the middle), there would be only 2 defectives per ***billion*** items (these numbers are for a single quality characteristic with a normal distribution). A six-sigma process is therefore capable of yielding virtually no defects, even though it is not free of variability.

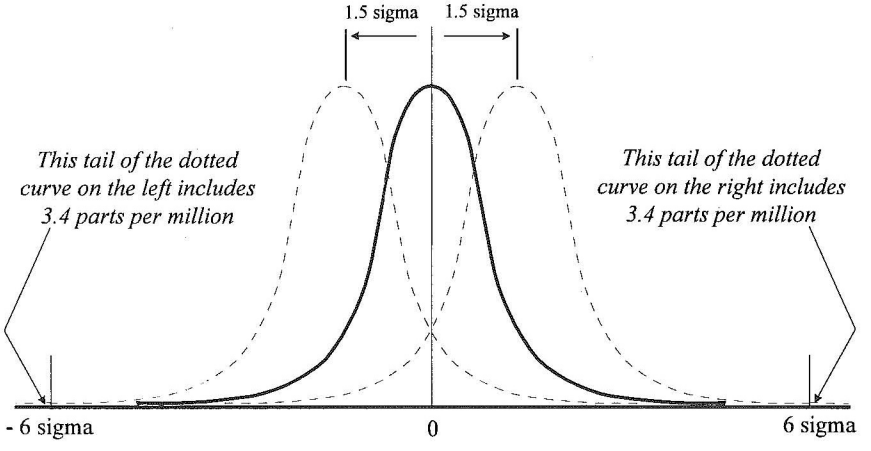


Figure 1. This figure shows the idea of six-sigma quality for a quality measure having a bell-shaped distribution. Tolerance limits are at a distance of 6 sigma from the center. Even if the process mean shifts up or down by up to 1.5 standard deviations, the resulting defective rate does not exceed 3.4 per million. Without any shift in the mean, defective rate is 2 per billion (combined tails of the solid curve in the middle).

To a small business that has a relatively small number of customers, six-sigma quality thinking is tantamount to the goal of *not losing even a single customer because of bad quality*. Striving towards this goal is an excellent guide for ensuring customer satisfaction and loyalty, *even though it may not be entirely practical*. This is because small businesses must build their reputation mainly by word of mouth, one customer at a time, rather than by mass advertising or other means available to large businesses. Though it may seem ironic, pursuing this goal can also be less expensive in the long run than compromising it. This is because six-sigma quality can only be achieved by improving the capability of production processes. This in turn leads to improved efficiency, elimination of waste, and reduction of costs. Thus, thinking in terms of six-sigma quality is desirable for small as well as large businesses. We shall further argue that achieving six-sigma quality can in fact be easier in small businesses.

In a recent investigation, Ahire and Golhar (1996), conducted a survey of 499 plant managers in 275 small and 224 large businesses in the motor vehicle parts industry. For each business, whether it had implemented a quality management program was recorded, and firms with fewer than 250 employees were classified as small businesses. Comparisons were made along the following quality dimensions: (1) Top management involvement, (2) Customer focus, (3) Supplies quality management, (4) Design quality management, (5) Benchmarking, (6) Statistical process control (SPC) usage, (7) Internal quality information usage, (8) Employee involvement, (9) Employee training, and (10) Employee empowerment. Comparisons based on the implementation of a quality management program showed significant differences in most of the dimensions, as well as in product quality, but comparisons based on size did not show significant differences. Differences that did show up were in SPC usage and employee involvement, and they actually favored ***small*** firms which had higher scores. Thus, the practice of quality management or attainment of high quality is apparently not constrained by size. Though small firms are limited in access to capital, market clout and other resources, they can nevertheless achieve high quality just as well as large firms. Small firms have better potential for high employee involvement, multi-functional and versatile employee skills, and encouragement of employee innovation, all of which contribute to high quality (Sonfield, 1984).

In another recent survey, Wijewardena and Cooray (1995) collected data from 52 small but growing manufacturing firms in Japan. Their focus was on the factors related to sales growth (measured over a ten-year period), and considered such factors as the age of the firm, size, advertising, research and development expenses, capital intensity, export orientation, market competition, and type of industry. Except for a type of industry variable, the only other significant growth factor was the ratio of skilled workers to total employees, a major determinant of quality. In a different context, Kaldenberg and Gobeli (1995) found that business outcomes such as increased revenue, lower cost, attracting new customers, etc. are positively correlated with quality management practices in dental services.

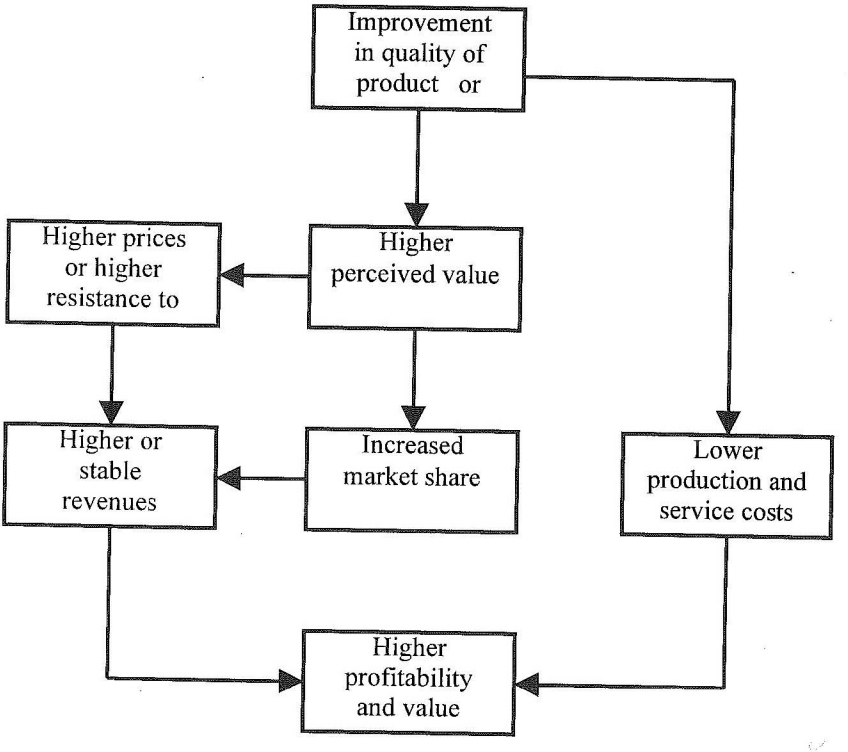
The primary means to achieving six-sigma quality is to eliminate the causes of quality problems before they lead to defects. Once a defect occurs, it can consume additional resources for repairs, or worse, it can be delivered to a customer without being discovered. If a customer is dissatisfied, the chance of losing that customer increases dramatically, and a small business can hardly afford the loss of ***any*** customers. To put it differently, the effect of losing a customer is greater in a small business than a large one. Six-sigma quality aims to prevent this from happening in the first place, and in doing so, it gives a high-quality image to the business. As new customers begin purchasing from a company known for its high quality product or service, market share and revenues also increase. This chain reaction set off by quality improvement is shown in Figure 2 (adapted from Evans and Lindsay, 1996).

In its common usage, six-sigma quality is a technical term based on statistical concepts. Used literally, it would mean that there is practically no chance of a defective

product or service reaching a customer. Here, we use six-sigma quality as a metaphor for management attitude that aims towards this state of affairs. It would be prudent for management to think of it as a way of minimizing risk, of losing customers or incurring waste that could have been prevented. Without six-sigma quality thinking, any business would be exposed to greater levels of these risks.

It is generally perceived that small entrepreneurial businesses do not internalize total quality practices, and six-sigma quality in particular, to the same extent as large companies. This is due to the notion that very high quality is expensive to achieve. We argue to the contrary that the management of a growing business cannot afford ***not*** to pursue six-sigma thinking. At the root of the argument is the observation that, almost without exception, small businesses that thrive also achieve high quality and customer satisfaction. Indeed, some important quality innovations have been pioneered by successful small businesses, such as providing personal service to each individual customer, and they have later been adopted by large organizations. Another example is employee involvement and empowerment which are characteristics of a well-managed small business, and which were later adopted by large businesses in the form of cross-functional teams and quality circles.

Figure 2. Effect of quality on the creation of value
(adapted from Evans and Lindsay, 1996)



It is worthwhile to re-emphasize that quality by itself does not ensure success, but that it is a necessary success factor in the long run. Businesses can exist and grow temporarily without focusing on high quality, provided that they offer unique products or services that have no competitors. In a competitive environment, such unique advantages can disappear quickly with the entry of competitors into the market, or the appearance of substitute products. In this context, Murphy's law may state, "You show me a profitable business, and I will show you a competitor." Today, the anticipated duration of almost any competitive advantage is rather short, and it is getting shorter with the spread of technology, electronic commerce, and rapid worldwide availability of information.

Quality At The Start

Most small businesses are born with one or two people as their founders who may also constitute their entire workforce. The founders are often very skilled in what they do, and usually, this is why the business is born in the first place. They do most of the work themselves, and when they hire new employees, they keep a close watch over what they do and how they do it. With fewer people making the products or providing the services, there are fewer sources of variability. Thus, high quality is easier to achieve in a very small startup business, and without requiring dedicated systems or specific resources for quality control.

In new small businesses, the founders are driven by a desire to succeed and to survive, rather than by quarterly rates of return as it is often the case in large companies. This leads to a constancy of purpose and commitment to quality that may not be true of the management of a large organization. Small businesses also have close relationships with their customers, neighborhoods and communities. They contribute directly to the economy in their local communities, and to the improvement of social welfare. All of these factors are conducive to the pursuit and attainment of high quality and customer satisfaction, and a resulting minimization of the "cost to society" that is considered to be a measure of quality by Taguchi (1986). Thus, high quality is usually a given for startup businesses.

Quality Can Become Elusive With Growth

A growing business necessarily becomes more complex as it grows. Certain tasks that the founders performed easily and skillfully must now be performed by others. As more people are hired, it also becomes necessary to delegate responsibilities. New people have to learn what they are supposed to do, sometimes down to the smallest details. The founders' knowledge and skills are no longer sufficient, and other people must acquire some of these skills. It therefore becomes necessary to ***train*** people to perform their duties, and to do this adequately, it is necessary to ***define***, ***describe***, and ***document*** the procedures to be followed. These can be daunting tasks for unprepared business owners, who find themselves in need of new organizational and managerial skills. Unless the founders are prepared for the increased complexity that comes with growth, the business can stumble or fall at this stage.

A case in point was recently reported by Yilmaz and Chatterjee (1997). The small company in question was a contract software developer for other companies. The founder of the company was a good programmer himself, and successfully developed several software products. As the demand for his software began to increase, he began hiring other programmers to help with development. Each new programmer would be given the assignment of developing some part of the project, along with a deadline for completion. There were no established procedures for programmers to follow or standards for testing

the programs, and programmers worked independently without knowing what other programmers were doing or how their work would fit together. Trial-and-error (or code-and-fix) was the common approach used by programmers. No project data was collected during development, and when completed modules were tested together, they would often fail to work as a whole. A great deal of effort was spent fixing bugs, and getting parts to work together. Deliveries were delayed and the quality of what was delivered frequently did not meet contract specifications. The business fell into disarray, and it began to lose customers as well as employees. The business never achieved the growth potential it had at the beginning.

Costs of Quality

Achieving high quality in a growing business entails added costs because of the necessity of defining and documenting procedures, training, record keeping, data collection, etc. The standard manual published by the American Society for Quality Control (ASQC, 1971) explicitly identifies several categories of costs associated with the pursuit of quality. They include costs incurred for the *prevention* of defects, *appraisal* of quality in production, *internal failure* of defects produced, and *external failure* resulting from defects that reach the customers, such as warranty repairs or lost future sales.

It is a common perception that small, growing businesses cannot afford these added costs, at least not as easily as large companies can. While this seems true on the surface, it reflects a lack of understanding about the growth process and the added complexity that accompanies it. Costs will rise as the business grows, simply because there will be more and new things to do, and new systems will be necessary to support these activities. The need for these systems and their costs must be anticipated and planned for. When viewed in this light, ***there are no unexpected additional costs*** in the pursuit of quality, only the costs associated with a larger business.

In the process of growth, a small business becomes a more complex organization, or even more generally, a system of interrelated subsystems. This is a new way of thinking for most entrepreneurs. Instead of focusing on individuals, it will become necessary to think of subsystems and their functions, such as production, marketing, accounting, human resource management, etc., and their relationships with each other. How will these functions be carried out? What methods and procedures will be used for each? How will the quality of outputs be evaluated? What data will be collected? How will defects be detected, and how will they be handled?

Ironically, questions like these are more difficult and costlier to resolve in large organizations than in small businesses which have the advantages of lower complexity higher potential for employee involvement, and collaboration. Failure to utilize these advantages at the growth stage can impede growth, and the issues can become even more difficult and costly to tackle later on.

ROADWAY TO SIX-SIGMA QUALITY AND GROWTH

It is natural that, in the pursuit of achieving high quality and growth, businesses differ from one another in various ways, but they also share some common characteristics. One of the shared aspects is the importance of an overarching management view, for which the theory of W. Edwards Deming is eminently appropriate, and another is a set of management tools that have been used successfully by many growing businesses.

Deming's Theory

In his last book titled *The New Economics* (1994), quality pioneer W. Edwards Deming emphatically argued that success in the world of modern business requires a management transformation to quality in all aspects of a business. His term for the means to this transformation was "the system of profound knowledge" which must be acquired and adopted by management. This system consists of four interrelated parts:

- Appreciation for a system;
- Knowledge about variation;
- Theory of knowledge;
- Psychology.

First in the system of profound knowledge is the recognition that an organization is a system of interdependent subsystems that work together to accomplish the system's aim. Subsystems include logistics, production, marketing and sales, customer service, as well as administrative subsystems such as accounting, finance, and human resource management. The system's aim is to stay in business and create value for owners, employees, customers, suppliers, community, and the environment. As Deming stated in the first his fourteen points, "constancy of purpose: to stay in business ever and forever ... to create jobs, and more jobs..."

The second part is the recognition that ***there is always variability in any process***: among people, in service, in product. It is important for management to learn about the ***reasons*** for variability in a business process, develop ***measures*** to quantify variability whenever possible, and to use these measures to ***track*** performance. Strict deadlines, numeric goals, or quotas are not consistent with a thorough appreciation of variation, even if they are based on historical data. It is better to work on reducing variability to produce the desired results. Rather than numeric goals or quotas, Deming believed that

management must provide the methods and training that are needed to achieve those results. As desirable as it is to hire good people, it is just as important train and develop them, and to create an atmosphere that allows them to perform at a high level. Penalties for failing to meet quotas, or monetary rewards for a exceeding them simply avoid the fundamental question, "How is this person supposed to do what he/she is asked to do?" or as Deming put it, "By what method?"

The third part, theory of knowledge, entails a management vision of how the business will "get there from here." It involves a predictions of the future of the business based on information about the past, current observations, and an insight or vision that links them to the future. By itself, information is not knowledge; a dictionary contains a lot of information but not knowledge. Knowledge requires a theory which can explain the past and allows predictions of the future, even though the predictions may not be accurate (due to chance variability, for example). Management of growth requires a theory of knowledge beyond ambition and entrepreneurship. To gain that knowledge, founders and managers need to continually educate themselves.

Clearly, knowledge about variation and its sources is an essential part of a theory of knowledge. A bell-shaped curve to represent the distribution of a measured quality characteristic is a theory about the process that generates the characteristic. Such a curve allows us to predict the proportion of defects that can be expected to occur if the factors influencing the system remain stable. Theory of knowledge requires management to study and learn about those factors.

The fourth part, psychology, helps management understand people. As individuals, people are naturally different from one another. They learn in different ways, they have different sources of motivation, and they also work in different ways in doing a given task. Management must be aware of people's differences, and use this awareness to optimize their abilities and inclinations. Performance ratings of people according to fixed numeric criteria are not consistent with psychology or knowledge about variation. A common pitfall for managers is to reward someone (including themselves) who performed above a numeric goal, or to chastise someone who fell short. This is indicative of a failure to understand variability as well as psychology.

TOOLS FOR SIX-SIGMA QUALITY

A number of tools are available to the management of diverse businesses in leading their quality efforts. Without attempting to give a comprehensive discussion or a mere listing of these tools, we mention a few conceptual tools that can help small business management in leading the attainment of high quality. Our purpose in doing so is to raise management's awareness of quality issues and methods, rather than to provide expositions of the tools. Ehresman (1995) provides a detailed manual for the various methods small businesses can use in implementing a total quality management program. Voehl, Jackson, and Ashton (1994) provide guidelines for small to mid-size businesses to obtain ISO 9000 certification, an internationally recognized symbol of the ability of a business to manage and achieve quality.

Two basic aspects of quality are the quality of design and the quality of conformance to design. Clearly, building quality into the products or services at the design stage can improve the likelihood of satisfying customer requirements, result in fewer changes in design, and reduce or eliminate defectives. For manufacturing processes, the idea of introducing quality at the design stage was developed by Taguchi for ensuring what he called robust quality (Taguchi and Clausing, 1990). This idea has since been adopted for a variety of products as well as services, and it culminated in the development of the Quality Function Deployment (QFD) method that has been used successfully by many organizations (Sullivan, 1986). This idea is also the foundation of the "house of quality" matrix developed by Hauser and Clausing (1988). In both developments, the basic approach to a high-quality design is to begin with the solicitation of ***customer requirements***, to analyze and prioritize these requirements, and finally, to translate them to design specifications. The end result of this process is a set of measurable technical product specifications as well as their priorities. Involvement of the customer in the design stage ensures that the ultimate product or service is what the customer wants, or as stated in one of the tips in Table 1, "Give your customers what they want, not what you want them to have." Although many small businesses do not have the resources to hire experts to do this, help may be available from a variety of sources such as the SBA. An interesting business-government-university collaboration in the state of New Hampshire is described by Gaudard, Schoof, and Paterno (1996).

QFD is an explication of the "Plan" phase in the famous Plan-Do-Check-Act (PDCA) cycle. The PDCA cycle was originally proposed by Shewhart in the 1930's, but it was popularized by Deming in the 1950s in Japan (where it became known as the Deming Cycle, and later exported back to the West). It is a never-ending cycle of continuous improvement consisting of planning, doing (experimenting with the plans), checking (studying the results of experimentation), and acting (on the results of the previous steps). This is shown in Figure 3 as a ball which is being rolled uphill and raising the level of quality in the process (Deming, 1982). The energy and direction for rolling the ball uphill must be provided by management, and six-sigma thinking can provide the impetus in this effort.

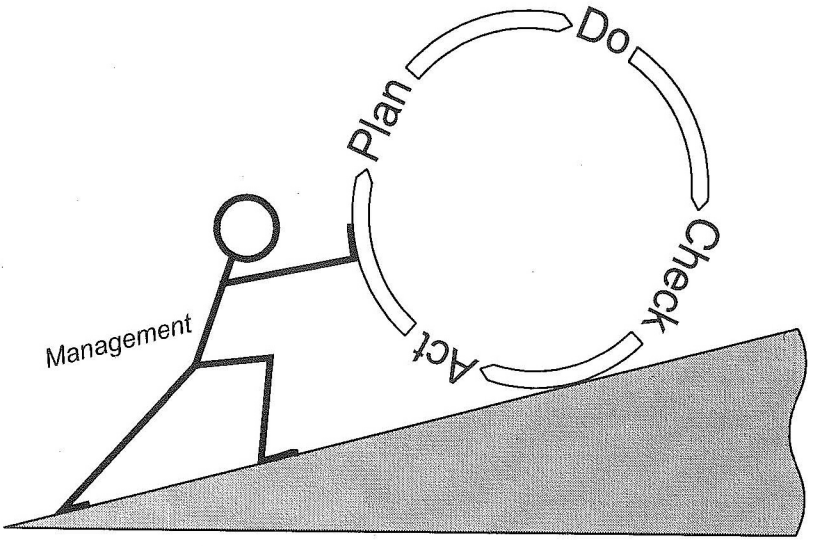


Figure 3. The Shewhart cycle for quality improvement. The rising incline indicates the improvement in quality. In Deming's view, management is responsible for pushing the level of quality up the incline (adapted from Yilmaz and Chatterjee, 1997).

Failure Modes and Effects Analysis (FMEA) is a useful technique that can be utilized to identify high-risk failure mechanisms a business process can experience, together with possible "counter-measures" to mitigate those risks. For some key internal business processes, common failure modes and counter-measures are given in Table 2 for illustration. Used with FMEA, six-sigma thinking can thus lead to more dependable, reasonably error-free processes. It is noted that a great majority of the counter-measures given in Table 2 involve the collection and tracking of accurate data about the process in each case. Along with the quality of performance in a process, this brings forth the importance of data collection, and the necessity of a computerized ***information system***. Even in a low-technology business, use of an adequate information system is essential for growth.

While it is desirable for management to study sophisticated quality tools and practices, some of the most useful tools are relatively simple and inexpensive to implement. After the sale of a product or service, for example, it is easy to obtain feedback from customers concerning their satisfaction, suggestions, or complaints (e.g., a brief postage-free questionnaire included with product shipments). Responses to these questionnaires can be very informative since the customers have fresh memories of their

experiences. It should be noted, however, that customer feedback can be useful only if the management is willing to track and act upon the opinions received. Similar to the lawyers' rule for examining witnesses at a trial, "do not ask a question if you do not know the answer," it can be said in the business context, "do not ask a question if you will not do anything about it."

Table 2. Failure mode and effects analysis (FMEA) for some key internal business processes.

Process	*Failure Modes*	*Effects*	*Counter Measures*
Costing	• Inaccurate cost data • Inaccurate cost allocation • Lack of timeliness	• Inaccurate cost estimates • Cost information not available • Inaccurate report of income	• Collect and track accurate cost data • Activity based cost allocation
Pricing	• Wrong pricing decisions • Wrong timing	• Lost sales • Customer dissatisfaction	• Collect and track accurate cost data • Track market price trends
Budgeting	• Wrong budgets • Lack of timeliness	• Loss of control	• Collect and track of budget data
Accounting	• Needed data not collected • Inaccuracies in data collected	• Inaccurate report of income • Inaccurate report of cash flow	• Improve accuracy of data collection and entry • Improve accounting methods
Capital Planning	• Lack of need assessment • Lack of planning	• Impact on current profitability • Impact on current profitability	• Establish criteria for capital decisions • Collect and analyze needs- related data (e.g. capacity usage)
Payroll	• Inaccurate payroll data • Mismatching of wages with work	• Employee dissatisfaction • Impact on shareholder concerns	• Wage/salary data collection • Track and review wages and salaries
Accounts Receivable	• Invoicing errors • Lack of timeliness	• Customer dissatisfaction • Impact on cash flow	• Collect and track accuracy of invoicing data
Accounts Payable	• Payment errors • Lack of timeliness	• Supplier/vendor dissatisfaction	• Collect and track accuracy of voucher payments
Inventory	• Inaccurate data on inventory levels • Errors in inventory valuation	• Overstocks or stockouts; • Impact on profitability	• Collect and track inventory data

CONCLUSION

The main focus of this paper has been to argue how six-sigma thinking can be a genesis for growth for small businesses. Our argument is that the adoption of six-sigma thinking can enhance the chance of success through improved customer satisfaction and efficient use of resources. While six-sigma thinking does not ensure long-term success and growth, there is no single controllable factor that can guarantee these outcomes.

Clearly, a small business can fail for a variety of reasons other than lack of quality. According to SBA statistics, as many as one out of four new businesses cease to exist within the first two years, and a vast majority of these are failures rather than buyouts by other firms. Common reasons for failure include lack of adequate financing, lack of demand for the products, and inability to hire and keep people with the necessary skills. Some family owned businesses fall apart simply because of infighting among family members. Unlike the pursuit of quality, such failures are often beyond the control of managers. Pursuit of quality is a controllable way of reducing the risk of failure and enhancing the prospect for growth.

The essence of six-sigma quality is the reduction of variability in the outputs of business activities. To appreciate this, management must anticipate the inevitable variability in all kinds of business processes, and be committed to study, understand, and control it as much as possible. Contrary to common thought, small businesses are as able to achieve high quality as large businesses. While large organizations have advantages in terms of access to resources and mass marketing, small businesses have advantages of their own in terms of "people" factors and lower complexity.

More than monetary resources, the pursuit if six-sigma quality requires an attitude favoring long-term commitment to quality. Costs range from insignificant to none when the gains ***and*** losses associated with quality are taken into account, and some even feel that it is completely free (Crosby, 1976). In an era of unprecedented accessibility and immediate availability of information in the marketplace, management's commitment to quality is a basic necessity for the survival of any business. The system of profound knowledge combined with six-sigma quality thinking can help the management of a small business as a rudder on the path to growth.

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