CHAPTER 1

WHY USE LEAN SIX SIGMA TO REDUCE COST?

With Michael L. George and Mike Tamilio

Several years ago, a hydraulic hose company that was a Tier 1 supplier of hoses and fittings to the automotive industry found itself barely profitable, generating a negative 2 percent economic profit. A telltale sign: customer order lead time was 14 days when the industry average was 7 days. Yet its leadership, not attuned to the relationship between process velocity and cost, didn't realize that *speed* was a main driver of the company's poor financial performance. In addition to long lead times, the company also suffered from poor quality, and frequently shipped defective brake and steering parts to its primary customers.

In less than two years, the company had made a remarkable turnaround (see Table 1.1).

How were such remarkable results enabled? Through a focus on cost reduction? Partly, but the strategic alignment was around **enterprise speed**—reducing waste *across* and *between* functional units, which brought with it cost reduction and true competitive advantage.

For example, one client was a leading manufacturer of heavy duty trucks. Unlike other customers of this Tier 1 supplier, the truck manufacturer created a high proliferation of end items (mostly low-volume runners) required for its wide variety of truck models. When we helped the hose company complete some complexity analytics (similar to those described in Chapter 10), we discovered that process improvement was *not* its highest opportunity area. Rather, long manufacturing lead times were caused by having to provide the vast number of part numbers for the truck company. Management at the Tier 1 supplier decided to drop the truck company as a client,

Table 1.1
Hose Company Results from Lean Six Sigma

Operating Margin	Improved from 5.4% to 13.8%
Capital Turnover	Improved from 2.8 to 3.7
Return on Investment Capital (ROIC)	Improved from 10% to 33%
Enterprise Value (Market Capitalization)	Improved by 225%
EBITDA	Improved by 300%
Economic Profit = ROIC% − WACC%	Improved from (−2%) to +21%
Work-in-Process (WIP) Inventory Turns	Improved from 23 to 67 turns per year
Customer Order Lead Time	From 14 days to 2 days

eliminate the related complexity, and focus on its remaining clients, those with higher volumes and fewer part numbers.

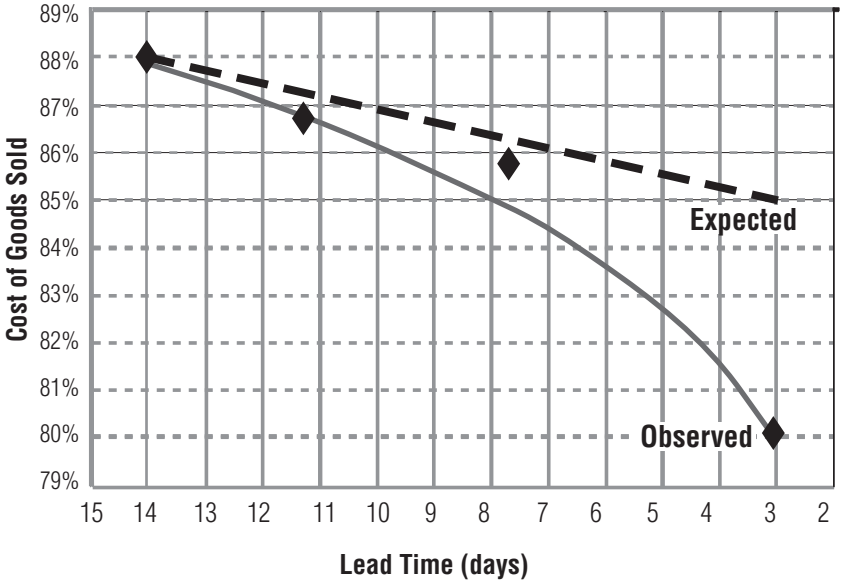
Eliminating that complexity allowed the hose company to focus on the next priority: reduce the number of defective brake and steering components shipped to America's leading automotive companies. So the hose company began an all-out assault on quality, with project identification and selection now prioritized around defect prevention. As shown in Table 1.1, quality improved from 3Sigma to 6Sigma on all critical-to-quality product specifications.

With product quality and consumer safety under control, the company was able to focus attention on Lean speed and flexibility. It launched a series of operations assessments that identified the cause of long process lead times and developed an appropriate mitigation plan that included the synchronized deployment of Lean tools (such as 5S, work cells, process flow improvement, setup reduction, and, eventually, pull systems).

This holistic approach—combining complexity reduction, quality improvement, and the elimination of process waste—delivered remarkable improvements. As noted previously, in less than two years, profit margins had doubled. But a picture is worth a thousand words! Figure 1.1 shows the drop in cost of goods sold as lead times dropped.

Notice that the rate of cost reduction was relatively slow initially, and then accelerated as cycle time was driven down to less than 25 percent of its original value. Based on the initial observations, one would have expected a linear relationship between lead time reduction and its effect on costs. Why did the rate of cost reduction speed up as lead times continued to drop? What was going on?

Figure 1.1
The effects of customer order lead time on manufacturing cost: For the whole company, cost of goods sold fell by 9 percent as the cycle time from the beginning to the end of production was reduced to 35 percent of its original value. At the same time, company profit increased from 7.3 percent on a sales increase of 13.8 percent.



Initially, process improvement projects resulted in reduced cost of poor quality and direct labor cost; savings typically associate with continuous improvement. While these projects were prudent, they yielded *relatively small incremental impact* to the overall business performance; certainly not enough to provide competitive advantage. You will recall that the hose company's manufacturing cycle time was initially 14 days on average, compared to its peer group's cycle time of 7 days (which was also the customer's accepted lead time).

When the hose company's lead time reached the peer-group average of 7 days, costs had been improving gradually. But when the company continued to strive for greater speed and reached a 3-day cycle time, the company's *operating performance enabled a structural advantage*.

There is, in fact, a threshold of cycle time that is needed to dramatically eliminate cost, to make the step-change from a mere operating advantage to a structure advantage. So the question for leaders becomes how much

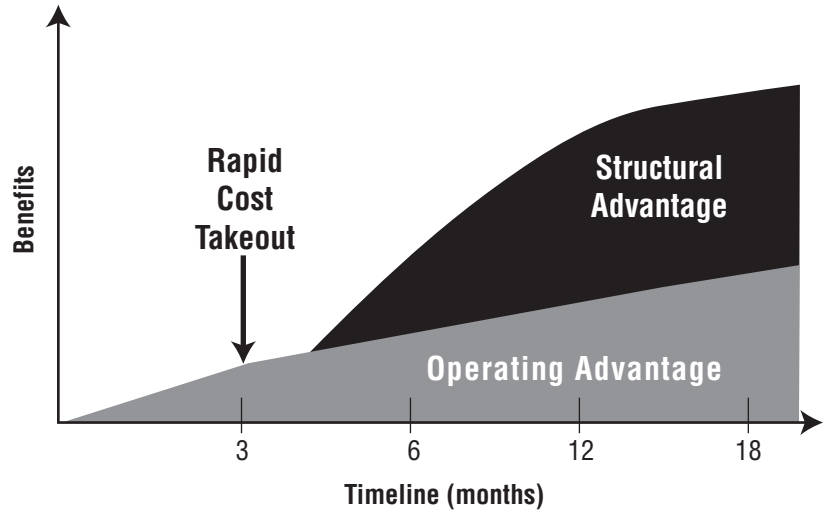
Customer Dissatisfaction and High Cost Processes Go Hand in Hand

As this hose company's experience demonstrates, slow processes make unhappy customers. We have been working with several clients to drive consistency, speed, and savings in their commercialization processes and in their sales pipeline. It has also become clear that problems with customer-facing processes are responsible for much customer dissatisfaction. Most companies will go to great lengths to please customers when they complain about a product, but ignore the aggravation that inconsistent responsiveness, delayed contracts, and unfriendly agents cause. A strategic project that focuses on the wastes and variability in these areas will achieve a double victory, reducing costs in critical processes while driving up customer satisfaction.

process velocity is required for our operational advantage to enable a structural advantage? Figure 1.2 reminds us that both of these elements are required to enable substantive reductions in cost.

In this case, once cycle time from start to finish was 50 percent less than the lead time demanded by customers, the company was able to close a large warehouse and quality containment facility. Closing the warehouse

Figure 1.2
Where operating advantage becomes structural advantage.



allowed the company to greatly reduce an array of costs frequently referred to as the "hidden factory." These included:

- Inventory
- Capital and equipment
- Energy
- Insurance
- Taxes
- Excess labor
- Transportation
- Handling, product damage

. . . and other costs that added no value from the perspective of the customer.

The correlation between speed and cost—both at a process level and at an enterprise level—is a powerful concept and one that has provided competitive advantage to manufacturing and services companies alike. The lessons we can learn from the hose company are that:

- Process-level speed is important and can confer some operating advantage, but by itself cannot fundamentally shift the cost base of the company.
- Enterprise-level speed and flexibility is where the biggest gains will come from, conveying a structural advantage that will let you supersede your competition, based on both speed and cost (but you can't achieve enterprise speed without process-level speed).

Benefits of Speed and Agility

The hose company just described created a true market advantage when it reduced its lead time by 80 percent across all of its products. The changes needed to achieve that velocity and agility also dramatically dropped costs.

While reducing costs is a good thing in its own right, it is also the case that faster cycle times and the flexibility to rapidly deliver all offerings in your portfolio will win more customers in a financial downturn because customers do not want to tie up their money in inventory; nor, in transactional processes, do they want to wait for new products, faster response, and so on.

TRANSACTIONAL EXAMPLE: LEAN SIX SIGMA TRANSFORMING OUR GOVERNMENT

The opportunity for cost reduction through cycle-time reduction was born in manufacturing but has proven to work just as effectively in nonmanufacturing applications. For example, U.S. Naval Aviation was one of the first government organization to implement process improvement across the enterprise. One example of the ability of cycle-time reduction to generate cost reduction occurred at the Naval International Program Office, which provides proposals to allied governments in response to their request for price, delivery, and specs—on an F/A–18, for example. The response originally required 5.5 man-years of effort and ranged from 30 to 392 days to respond. Customers found significant errors in 91 percent of the proposals. Further, a study of naval weapons systems showed a high correlation between cost overruns and excess cycle time.

Through prioritized project identification and selection and the application of Lean Six Sigma, the average response lead time was reduced to 11 days and the error rate to 8 percent. The overall cost of proposal preparation was reduced by 36 percent, and customer satisfaction dramatically improved. The gains were recognized at the highest levels.

THE ALLOY OF HIGH PERFORMANCE: WHY CHOOSE LEAN SIX SIGMA TO REDUCE COST

The more we have tested and implemented the central tenets, tactics, and tools of the combined Lean Six Sigma methodology, the more convinced we've become that both are essential to rapid and sustainable cost-cutting. The integration of Lean and Six Sigma is one of the most effective methods for consistently improving cost, speed, and quality, with broad successes in service as well as manufacturing functions. Companies have experienced unprecedented cost savings in diverse areas:

- Feeding higher-quality leads into the sales funnel at a fraction of the cost.
- Reducing developmental timelines for new products by 20 to 50 percent while nearly eliminating the high cost of defects.
- Slicing away complexity and variability throughout the supply chain to yield 10 to 30 percent cost savings while shortening process lead time by as much as 80 percent.

These transformations and cost savings are achieved in three- to five-month projects, a timeline made possible by the powerful combination of Lean speed and Six Sigma quality. The true power of the merger of Lean and Six Sigma as a single solution is in its unsurpassed ability to expose the wastes and complexities that are hidden in underlying processes. Cost-cutting measures can then be sequenced for cascading returns at the organizational level.

Lean Six Sigma is the synthesizing agent of business performance improvement that, like an alloy, is the unification of proven tools, methodologies, and concepts, which forms a unique approach to deliver rapid and sustainable cost reduction.

Alloys form new products of high utility from preexisting materials. But, unlike some alloys that lower the purity and value of the source materials, Lean Six Sigma multiplies the additive value of its elements.

- *It's fast,* delivering substantive results literally in a matter of weeks.
- *It's efficient,* delivering exceptional reductions in cost with relatively low investment. Companies featured in this book have realized rates of return at the project level equal to 5 times their investment, and rates of return at the program level 12 times or greater.
- *It's effective,* providing a mechanism to identify, leverage, and replicate best practices in cost reduction across the enterprise.
- *It's practical,* providing fact-based, analytical, straightforward methods used to uncover the root causes of high cost; get waste out of processes; and transform plans into actions.
- *It's game changing,* creating competitive advantage in terms of operational cost, customer quality, and enterprise speed:
  - — Reducing direct labor costs.
  - — Lowering indirect costs.
  - — Improving return on assets.
  - — Accelerating customer order lead times.
  - — Improving overall customer service levels.
  - — Enabling enterprise flexibility—responsiveness to changes in customer needs and market demands and economic conditions.
- *It builds capability.* Whether simple project execution or enterprise transformation, Lean Six Sigma imparts capability to the organization in a blended array of methods, including e-learning, classroom participation, experiential learning, or ''just-in-time'' project support training.
- *It's transformational.* Resources at all levels are engaged and aligned toward common goals and projects that support business strategy.

Company culture can truly transform as resources are provided with a fact-based improvement methodology and infrastructure that supports and empowers the entire organization to continuously drive toward higher performance.

- *It's sustainable,* linking process metrics with performance management; engaging process owners; and empowering front-line resources by providing them with control mechanisms to sustain gains.

Perhaps the most important advantage of Lean Six Sigma is that it lets you cut fat, not muscle—that is, reduce costs without destroying the ability to meet customer need.

Over the past year, as the world, and in particular the United States and the United Kingdom, have been battling the recession, all companies and many government agencies have been looking at almost any way to reduce costs. However, in many cases, companies in the process of cutting costs have also inadvertently damaged the fabric of the business. They have cut the muscle that is required to effectively serve the needs of their customers in the process of trying to remove the fat that is weighing down the business.

The contraction in demand at the end of 2008 was so severe that many companies had to take drastic action to align their cost base with current and future demand (although that was very difficult to predict, and the forecasting remains challenging). In all businesses or organizations, it is only logical to reduce capacity to meet demand. This can be done fairly safely if the organization knows and understands how the activities in the business react to a drop-off in demand. Where the organization doesn't understand how the business reacts to a drop in demand, or management wants to move beyond "right-sizing," the risk of cutting the muscle rather than the fat becomes more likely.

The problem of not understanding how an organization reacts to a drop in demand is actually surprisingly common, particularly in service industries such as banking and insurance and in government departments. It is in these industries and agencies that we have seen some of the most aggressive but potentially damaging cuts to cost bases.

Companies can't undo decisions made in the past, but they can be more effective in the future, as the need to continuously look at how to cut the cost base and increase productivity will not go away in this highly competitive economic environment.

LEAN SIX SIGMA VERSUS TRADITIONAL COST-CUTTING TACTICS

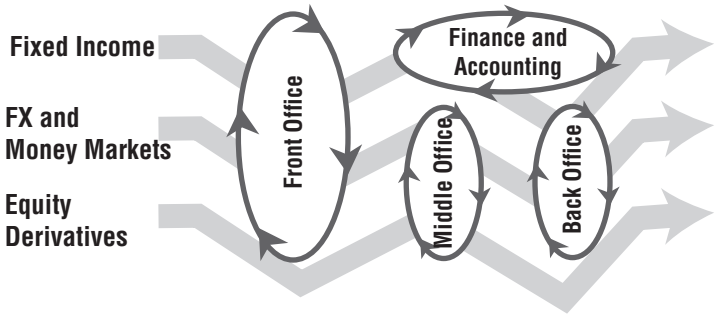
When working with clients in this and past recessions, the approach to cost-cutting has been dominated by functional cost assessment carried out by the finance function. Our experience has been that upon review of the largest cost areas, senior management either direct where the cuts will be made or provide targets for each function or business to reduce their cost base. While this approach often yields quick results, it tends to have a couple of severe limitations:

- The cost reductions are focused on functions. There is little regard for the impact that reductions could have on the rest of the end-to-end process. Therefore, there can be, and often are, unintended consequences from the actions that are taken.
- The linkages between functions often break down and, as a result, rework and lead times increase and quality of service declines.
- Savings tend to be unsustainable as the core skills required to run the processes are no longer available to execute the processes to the quality required by customers.

So, in effect, the cost-cutting is responsible for breaking the fabric of the processes required to serve customers. An example of the type of confusion this can cause can be witnessed in many of the front, middle and back offices of the world's largest investment banks (Figure 1.3). Here, tremendous reductions in staff have cut out many roles necessary to link processes together across different functions and successfully execute and account for a trade accurately. In one instance, we witnessed 3 different managers at operational risk in a 12-month period, just when the SEC, FSA, and other regulatory bodies had been asking banks to better understand the risks inherent within banking operations.

As you can tell from the title of the book, our focus is on how Lean Six Sigma can help you reduce costs and avoid the pitfalls of traditional cost-cutting approaches (see the sidebar, "Common Pitfalls of Traditional Cost-Cutting Approaches") while delivering lasting efficiencies and savings to the bottom line. Cost reduction, as a term, is most often associated with plant shutdowns and mass layoffs. These truly are slash-and-burn reactions. Such maneuvers, in reality, often hurt the business and the customer by failing to distinguish between what is truly wasteful in the process and what is

Figure 1.3
Functional turmoil caused by ill-thought-out cost reduction can lead to poor execution and low customer satisfaction.



actually valued by the customer. Often, the idea is to cut 10 to 20 percent of the resources and hope the rest will pick up the slack. It never really happens. The slack remains, and it is felt through increasing delays in customer complaints, driving depressed revenues down even further.

These responses to economic pressure fail to position the company with innovative, competitive processes that will outperform the market in recessions and in economic recovery. The crisis may pass, but the choices made during the crisis can persist indefinitely.

Cutting costs via Lean Six Sigma is very different from traditional cost-cutting practices, as outlined in Table 1.2.

In short, Lean Six Sigma cost-cutting is process focused. We have created an analytical method called Prime Value Chain analysis (PVC), described in Chapter 10, that is designed to illustrate how different functions coordinate to deliver the activities that create value. It also illustrates the resources that it takes to deliver the different activities. Using this approach, combined with end-to-end mapping, allows senior managers to see across the value chain to identify where there are excess resources that are not essential to executing the end-to-end process. These are resources that are either surplus to demand (fat) or that can be eliminated via productivity improvements based on process improvements (the equivalent to increasing fitness, to extend the analogy). For it is only through increasing productivity that organizations can do "more with less." Without increasing productivity, reducing staff only enables you to do "less with less." And unlike functional cost-cutting, if the productivity improvements are implemented effectively, they will tend to be far more sustainable. With a strong continuous

Common Pitfalls of Traditional Cost-Cutting Approaches

- *Failure to focus on the process rather than rolling out tools*. Many organizations learn about individual tools and attempt to roll them out. It is not about implementing an individual tool, such as Value Stream maps or 5S, it is about identifying root causes of costs and applying the right tool to close that gap.
- *Lack of understanding of the voice of the customer (VOC)*. Therefore, needless complexity and overprocessing encumber the system. Customers determine what is truly "value add." Without understanding VOC, safe and effective waste elimination cannot be achieved.
- *Failure to understand the costs of complexity*. Most organizations fail to recognize that each offering or transaction type introduced into the processes drives higher cost. The relationships between offerings and process are rarely understood.
- *Just doing it,* without sufficient analysis, preparatory work, baseline data, process ownership and accountability, and control plans to sustain improvement efforts.
- *Turning to technology as a solution for every ailment*. If the solution to every business problem begins with IT, and the company has not first considered the process itself, the solution may be suboptimal and costly.

Table 1.2
Comparing Traditional and Lean Six Sigma Cost-Cutting

Traditional Action	*Common Pitfalls/Risks*	*Alternative Lean Six Sigma Approach*
Headcount reduction	There was a time when headcount reductions were an easy fix for cost-cutting. Many companies have productivity ratios far below industry leaders, making headcount reductions a necessity for competitiveness. This is no longer true. Most organizations today run on skeleton crews, compared to those bloated years. Further cuts are dangerous if they are not done carefully, and only after eliminating waste. There are well-documented repercussions,	Rapid cost-cutting can be achieved by eliminating wasteful process steps, including many that are overprocessing items. By looking first at the waste in these steps, further capacity can be liberated. As the process is streamlined, there are often many savings captured that can render a headcount reduction unnecessary; or talented individuals can be redeployed to essential activities and other cost-cutting Lean Six Sigma projects.

(*continued*)

Table 1.2 (*continued*)

Traditional Action	*Common Pitfalls/Risks*	*Alternative Lean Six Sigma Approach*
	including the demoralization and slowing of the remaining workforce, the ensuing flight of brain power, and the inability to ramp up for future demand.	If excess capacity does exist, Lean Six Sigma can help ensure that customer service levels and quality can remain intact during the capacity re-balance.
Capacity decrease	Mistakes abound in a crisis. Firms are in survival mode. Cuts are dictated across business units, and managers are forced to close down capacity to meet shrinking demand. This is done by eliminating shifts, running shorter batches, or closing down operations. Traditionally, these moves take far too long to achieve, and come with enormous trade-offs in ability to ramp up and maintain market share coming out of a demand slump.	A project focusing on the right capacity levels can ordinarily be completed in less than three months (even for multinational organizations). Capacity levels need to reflect current levels of demand, taking into account statistical considerations for the variability and demand by offering as well as potential impacts on delivery requirements. If ramping production down irritates customers with late deliveries, the cost savings can be minuscule compared to the loss of revenue. Using the Lean Six Sigma toolkit, capacity can often be optimized inexpensively. Then, decisions can be made statistically, on a product-by-product, service-by-service basis. This yields the best balance between cost reduction and demand profiling.
Inventory reduction	Reducing inventory levels in tight times is as old as business. A look at the balance sheet of most companies will reveal that there are still excessive inventory levels. The traditional cost-cutting reflex tends to set a percentage reduction across the board. This is both unwise and unproductive. The inventory levels are often incorrect or muddied by overaged and obsolete material. Reductions come as a large write-off with some cash, but actually negatively hit the balance sheet. Remaining inventory levels still have too much of the wrong items and too few of the right items.	High inventory levels can be a result of waste in a process stemming from poor execution and process performance, ill-conceived policies and procedures, lack of integrated planning and scheduling, inflexibility and low equipment or operator reliability, and so on. Starting with the largest costs and volumes, it is more effective to streamline the processes feeding inventory into the warehouses. Often, pull systems can replace push systems for immediate and permanent reductions in inventory levels, with the advantage of easy ramp-up when demand increases.

Table 1.2 (*continued*)

Traditional Action	*Common Pitfalls/Risks*	*Alternative Lean Six Sigma Approach*
		As process speed improves, flexibility increases, and deliveries are made on time with fewer and fewer items in stock.
Price increases	More companies are pursuing the business model of specialization rather than commoditization. It is difficult to find an organization that believes it is something other than a specialist. If customers can be convinced they are receiving specialized items, rather than a commodity, they can be convinced to pay more. One rubber products company recently went into bankruptcy after raising rates for its clients by 20 to 30 percent. It turned out, their customers already knew they were buying a commodity. Words alone will not convince customers that your organization is adding specialized value, and everyone believes they are adding value.	Understanding customers' real needs and identifying value that can be improved, as well as waste that can be removed, allows you to effectively drive cost reductions in existing processes without harming the customer. The Lean Six Sigma toolset defines these needs while making the resulting improvements highly visual. Exploring these solutions together with the customer often leads to agreements for higher prices. At the bare minimum, cost savings are achieved in the resulting processes. Lean Six Sigma can also help develop flexible pricing processes that optimize transaction prices and contractual terms where perceived differentiation and value exists.
Demanding productivity	Companies have often demanded improvements in productivity without using the Lean Six Sigma methodology. Processes will not improve because we ask them to. We cannot expect better performance from people stuck in bad processes.	Companies seek immediate returns using a proven disciplined methodology. A useful productivity metric presented in this book is Process Cycle Efficiency (PCE). Analysis of low PCE can uncover root causes of high cost and low performance and lead to effective mitigation approaches.

improvement culture, productivity improvements can be built upon to create a virtuous cycle of improvement.

Taking a process perspective also gives managers real insight into the impact that making reductions will have elsewhere in the process, so the likelihood of changes having unintended consequences (that is, reducing important muscle from the operation) is dramatically reduced. It also gives a clear picture of where the business should focus to improve its operations in the short to medium term so it can consolidate the gains that have been made and look to how it can create a competitive cost advantage.

Managers need to understand what they are cutting before they get out the meat cleaver to cut costs. Attacking the largest cost areas while providing short-term cost reductions can lead to significant unintended consequences that can be difficult and expensive to fix. We recommend that understanding how an organization executes the processes that deliver value to customers is the first step to being able to cut fat from an organization, rather than the muscle that binds it together.

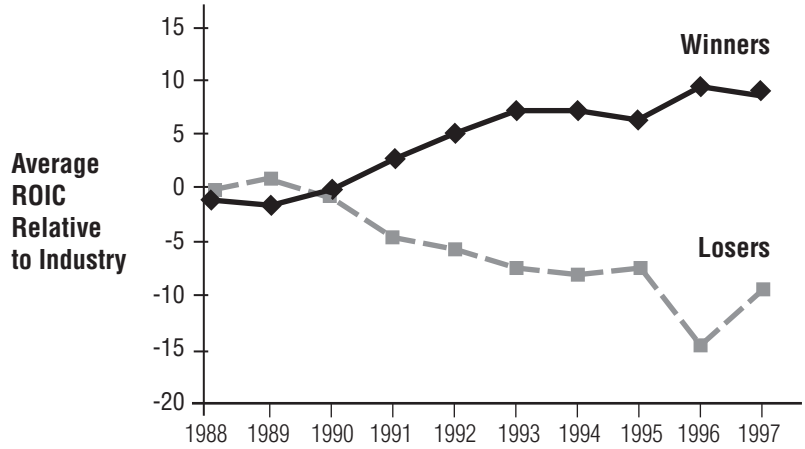
EMERGING STRONGER THAN EVER

Competitors may try to copy your products and offerings—but it's nearly impossible for them to copy your processes.

—Lou Giuliano, former CEO, ITT Industries

At the same time Lean Six Sigma can support near-term, local, cost reduction opportunities, it also enables transformational change that provides competitive advantage, *beyond cost*, especially once the enterprise emerges from the downturn. Why is this true? This book shows how the Lean Six Sigma approach yields rich visibility into the root causes of operational

Figure 1.4
ROIC of winners versus losers: Winners are those that outperformed others in their industry for the six years following the recession of 1990–1991; losers are those that under-performed others in the industry. Following a recession, winners that view downturn as an opportunity to improve business performance pull away from the competition.



Source: Accenture High Performance Supply Chain Research Initiative, 2008.

cost, and provides an understanding of the dynamic relationships between processes, offerings, people, capital, equipment, suppliers, materials, and—most importantly—the customer.

In its ability to address these elements, the Lean Six Sigma cost reduction approach provides an all-important residual benefit: effective and predictable execution. Lean Six Sigma helps stabilize processes and makes them more predictable; it reduces order lead times and improves fulfillment rates; it uncovers what is truly valued by the customer, and helps deliver that value at the lowest possible cost to the company. We know of no other cost reduction approach that can rapidly drive such increased internal efficiency while at the same time improve the enterprise's ability to dependably serve its customers.

High-performing organizations manage their cost reductions strategically during economic downturns and strengthen their existing positions. These organizations view a downturn as an opportunity to improve business performance, to take market share, and change their competitive position. They make fundamental changes to increase cash flow and to drive sustainable results. They advance their strategic position by building differentiating capabilities, shedding/acquiring assets and businesses, anticipating downturns, and positioning themselves for better performance postrecession (Figure 1.4).