PART I

Primary Areas of Cost Reduction

CHAPTER 1

The Cost Reduction Process

Introduction

The reason for having an active cost reduction program is quite simple. A company can work extremely hard to obtain one extra incremental dollar of revenue, which will yield a net profit of perhaps 5 percent. Gaining that extra revenue dollar will be uncertain, and it may be difficult to attain the targeted profit. Alternatively, and using the same profit percentage, a cost reduction of one dollar would have required 20 dollars of revenue to generate. Further, a cost reduction is entirely within the control of a company, whereas a revenue increase is not.

The calculation for the equivalent amount of revenue needed rather than saving one dollar of cost is:

1/profit margin = Equivalent amount of sales

The next table shows the equivalent sales that would be needed at various profit margins in order to equal one dollar of cost savings:

Net Profit	Equivalent Revenue
1%	$100
2%	50
5%	20
10%	10
15%	7
20%	5
25%	4

Thus, even a spectacularly profitable company having 25 percent profitability would have the choice of either creating four dollars of revenue or reducing costs by one dollar.

Also, assume that a cost reduction is not a one-time event but rather is a continuing cost reduction that otherwise would have been incurred in every future year. By eliminating this type of cost on an ongoing basis, a company can achieve compounded gains that keep piling up in the future.

Given the obvious economics of cost reduction, why do companies not practice it more often? They typically ignore it until they get into financial difficulties and then impose a sudden across-the-board cost reduction. The better approach is a long-term, ongoing analysis of every part of a company, with an emphasis on maintaining full funding of the overall strategic direction and a careful paring of other costs with surgical precision. This chapter describes the advantages, disadvantages, tools, and process flow of a successful cost reduction program.

Need for Cost Reduction

An ongoing program of cost reduction is not really an option for a company that wants to remain competitive over the long term, since it is subject to many issues that can negatively impact its profits, as the next subsections reveal.

Revenue Declines

The need for cost reduction starts with revenue: If a company's products and services are subject to significant price declines, then costs have to also drop to keep pace. It is useful to stress test the sales forecast with a variety of worst-case scenarios to see what would happen to profitability in the event of a major price decline. Another option is to watch the results of other companies located in the same industry or tangential ones to determine the extent of price elasticity.

Rapid price declines are a particular problem when there are low barriers to entry, so that new competitors can easily enter the market and drive down prices. Price declines can also occur when fixed costs are a large part of the product cost structure, so companies have an incentive to fill their available capacity by driving down prices (see the next subsection). On a more short-term basis, prices also drop when there is a great deal of unsold inventory flooding the market.

In all of these cases, revenue declines can be so severe that a company that was initially awash in profits may very suddenly find itself in a significant loss position.

Fixed Cost Base

A company may have an exceptionally large fixed cost base, perhaps due to a fixation on high levels of automation, or simply because the market

requires a great deal of equipment in order to compete. A high fixed cost base means that a company has to operate at a relatively high percentage of capacity in order to turn a profit. This is a major problem in industries where everyone has a large fixed cost base, since an industry slowdown means that prices will drop dramatically as everyone tries to keep their capacity levels high.

A determined and ongoing cost reduction campaign is an excellent way to avoid this trap. With a lower fixed cost base than competitors, a company is much more capable of riding out an industry downturn and may even be able to snap up any competitors that have not had the prescience to similarly engage in an active cost reduction campaign.

Creeping Costs

If there is no active campaign to reduce costs, then by default costs will increase; they will not hold steady. The next factors all work in parallel to increase costs:

- *Complexity.* Processes always become more complex over time, as they expand to encompass new products, services, and situations. Complexity increases a variety of expenses, but in particular requires more staffing. See the next subsection for an extended discussion of this topic.
- *Entitlements.* Benefits increase over time—they rarely decrease. Once a benefit is granted, it is very difficult to reduce it but quite easy to add to it.
- *Inflation.* Costs will naturally increase with the rate of inflation, but this is not acceptable if a company's revenue increases are not keeping pace with inflation.
- *Tradition and inertia.* In general, if an expense has always been incurred, then a company will continue it. There is rarely a discussion of reducing an expense, only of adding to it.

For these reasons, cost creep is an insidious and ongoing issue that slowly reduces a company's profitability at a pace that is barely recognizable over the short term. Since it is not a sudden event, management is not motivated to take action for a long time, at which point a great deal of effort will be needed to revert to the earlier level of profitability.

Complexity

One of the chief causes of excess costs is the presence of too many layers of management. Each manager requires a separate set of reports to monitor his or her area of responsibility (which takes time to create) and tends to

acquire support staff. It is better to flatten the management structure of an organization, so that fewer managers supervise the activities of quite a large number of employees. Not only does this approach eliminate the complexity that comes with too many layers of management, but it also brings top management closer to a company's operational levels.

An excessive quantity of reports also contributes to complexity. Each one requires some data collection as well as aggregation into a report. Even if a report is automatically generated and distributed from a computer database, it may still waste the time of the reader, who no longer needs it. Further, an automated report may draw on information that was originally added to the database specifically to create the report, and which is now still being collected.

A report may originally have been created as a one-time report and morphed into an ongoing one. Or it may be associated with a process that is no longer used. Alternatively, it may have been created for someone who is no longer with the company, and it was inherited by her successor. All of these reasons can explain the presence of reports that are no longer needed but that continue to plague employees.

Quite a serious form of complexity is customized systems. A company will find that it can acquire commercial, off-the-shelf (COTS) software that is perfectly acceptable for most of its operations. However, these systems will not exactly match the company's underlying process flows, so there will be pressure from employees either to modify these packages or to create entirely new ones in-house. These customized systems are difficult to maintain and are much more expensive than COTS systems, so they introduce a significant amount of costs that are probably not necessary.

These examples show that complexity can arise in a variety of places in an organization—in its organizational structure, reports, systems, and so forth. Each type of complexity brings with it an increase in costs that can only be reduced through a considerable and ongoing change effort.

Acquisitions

The cost of complexity arises in particular when a company starts acquiring other businesses. An acquiree rarely serves precisely the same markets or has the same corporate structure or offers the same products. Consequently, an acquirer must somehow create an overall corporate structure that integrates two disparate businesses, which generally results in a combined entity that is less optimal than the original business. If these issues are expanded to a large number of acquisitions, then the cost of complexity becomes even more widespread.

However, there is one case where an acquisition strategy can *lower* costs. This is when an acquirer specifically searches for target companies

that have lower costs than the acquirer and buys them specifically to spread that low-cost knowledge throughout the rest of the organization. This requires an excellent ability to force change throughout an organization.

Partnerships

A company may have a variety of partnerships, such as for research and development, or for production distribution, or for independent salespeople. Each of these partnerships requires some time by management to monitor and so increases costs to some extent. These partnerships may have been in existence for a long time and so may be continued more because of tradition than due to their profitability.

Because of their associated costs, all partnership agreements should be reviewed regularly to ensure that a company is earning a reasonable return. A major warning flag for these reviews should be any partnership that is characterized as "strategic," especially if it has not generated a return since its inception. Strategic partnerships typically have the support of a senior-level manager and so are not easily discarded, but their ongoing cost should be noted.

Advantages of Cost Reduction

Cost reduction is the easiest and most certain way to increase profits in the short term. It can also be a major driver of long-term growth, if handled properly. Why is it easy? Because cost reduction is entirely within the control of the company. Simply determine an area for cost reduction and implement it. It is completely unlike the uncertainty of trying to increase revenue, where one must be concerned about pricing, margins, the actions of competitors, and governmental regulation. Cost reduction is the simplest road to increased profitability and enhanced cash flow.

Cost reduction also works well for long-term profits, so long as the process becomes a core belief of the entire company and is constantly readdressed. The selection of cost reduction targets is key, since cost reduction over the long term cannot undercut a company's profit-making capabilities. Instead, the focus should be on constantly paring away unnecessary expenses, increasing efficiencies, and streamlining processes. In addition, it helps to continually reinvest some portion or all of the cost reduction savings back into the company's people, processes, and technology.

A company that publicizes its continual efforts to reduce costs is effectively signaling to potential market entrants that they will have a very difficult time competing on price, since the company can likely weather any such attacks with ease. Conversely, a low-cost company has a powerful

tool available for undercutting companies in new markets and so can aggressively pursue its more bloated competitors.

Disadvantages of Cost Reduction

Cost reduction sometimes can earn a bad reputation if it is handled incorrectly. The worst form of cost reduction is the blanket percentage cost reduction that is imposed throughout a company. This arises when senior management suddenly realizes that the organization will not achieve its targeted numbers and decides that everyone will share equally in the pain of a cost reduction.

The blanket cost reduction has three bad effects.

1. Any department that has already voluntarily reduced its costs substantially must now find a way to cut expenses farther, probably to the point where it cannot complete its assigned tasks.
2. Managers who have experienced multiple rounds of these imposed cost reductions then realize that their best hope of survival is to pad their budgets with *extra* expenditures, so that they will have enough fat to cut from their budgets the next time a cost reduction mandate arrives.
3. A blanket cost reduction tends to result in the elimination of "soft" expenses that are needed for long-term growth, such as employee training or new investments in business development, additional salespeople, and fixed assets. If these expenses are trimmed, then a blanket reduction tends to harm a company's long-term growth prospects.

The effects noted here can be eliminated through the use of a more targeted cost reduction program, as noted later in the "Process Analysis" section. Even a well-run cost reduction program will face additional difficulties, as noted next in the "Cost Reduction Politics" section.

Cost Reduction Politics

There can be considerable dissension within a company if cost reductions have a particular impact on lower-paid employees; unless they see a comparable level of cost reductions on other employees in other pay grades, their morale will decline, and both employee turnover and work stoppages may not be too far behind. For this reason, it is best to apply cost reductions throughout an organization at the same time, so that everyone feels they are sharing the pain of the reductions.

In particular, the management team should share a greater proportion of the cost reductions than anyone else, so everyone can see that they are being equable. For example, if the management team takes a 20 percent pay reduction, they will meet with a much higher level of acceptance if they then ask everyone else to take a 10 percent pay reduction.

Another issue that can engender political maneuvering is the "sacred cow." From the perspective of cost reduction, this can be any expenditure that is clearly not needed for forwarding a company's strategy but that receives strong internal support. There may be a lengthy historical basis for continuing the expenditure, or perhaps it is supported by an especially powerful manager. In such cases, it may not be possible to eliminate the expense immediately. However, one should at least bring it to management's attention on a regular basis and be sure to charge the expense against the budget of the person who supports it.

Cost Reduction Priorities

When deciding on a course of action for cost reductions, the first step is to decide on the most strategically important part of the business that is needed for future growth and channel all cost reductions *around* it. If anything, some portion of the cost reductions from other areas should be shifted *into* this area.

The second cost reduction step occurs at the highest possible level and is the decision to retain or eliminate entire businesses or product lines. If there appears to be no hope of continuing profitability in such areas, and the company has no plans to invest aggressively in them, then management should make the decision to eliminate them. By doing so, the remaining parts of a company can focus clearly on cost reduction in other areas rather than having their efforts watered down in businesses that the company no longer wants. This is a particularly appealing approach if a company is essentially a conglomerate, with no discernible incremental profitability gains occurring because subsidiaries are part of a larger entity. In such an environment, all the costs related to aggregating financial information and "managing" subsidiaries introduces a level of complexity that merely increases costs with no offsetting benefit.

The third cost reduction step is to conduct a throughput analysis of the remaining parts of the business. Throughput is sales minus total variable expenses, and tells management where a business is (and is not) making money. Throughput analysis also involves finding out where a company's bottleneck operation (also called its constrained resource) is located and how to maximize throughput by focusing closely on the operations of that bottleneck. Throughput is an important concept for cost

reduction, so Chapter 12, "Throughput Analysis," is devoted to it. For the purposes of this list, throughput tells management where they can safely reduce expenses and assets, and (more important) where they *cannot* do so (namely, in functions that support the bottleneck operation).

The fourth step is to see what costs can be reduced through outsourcing. This step is needed early in the cost reduction process, because management needs to decide if it should allocate significant cost reduction resources to an activity or simply hand it off in exchange for immediate cost savings. This step should follow the throughput analysis, since management needs to know how an outsourcing decision will impact a company's total throughput.

The fifth cost reduction priority is to clean up the company's financial reporting systems, so that management can clearly see where costs are being incurred and which functions are losing money. These items should be implemented:

- *Corporate overhead allocation.* No corporate overhead should be allocated anywhere. Corporate overhead is a discrete cost that is incurred by the corporate headquarters and should be examined for cost reduction purposes as part of that entity. Allocating overhead anywhere merely makes it less clear where costs truly are being incurred.
- *Service center allocations.* A company may elect to spread the cost of its service centers, such as the mail room, maintenance department, and power plant, to other departments. All of these allocations should be eliminated and shifted right back to the service centers, for two reasons.
  1. Allocations may not be on a usage basis—instead, they may depend on the negotiating ability of each department head, which makes them useless for cost analysis purposes.
  2. A cost reduction team can simply review the costs of each service center; it does not care about where costs are subsequently allocated, only where they originate.
- *Profit center reporting.* Whenever possible and reasonable, revenue should be assigned to a cost center, so that profitability can be determined. This information is useful for cost reduction triage—deciding which areas are in the most desperate need of cost reduction assistance.
- *Transfer pricing.* Transfer pricing should be at market rates only. When goods or services are transferred between company divisions, their cost should reflect what a subsidiary would have had to buy them for on the open market. Any other internally negotiated price merely reflects the ability of a company manager to negotiate a good rate and obscures costs.

At this point, a company has considered cost reduction issues at the business unit level and created enough throughput and financial reporting systems to know where there may be cost reduction opportunities. It is now time actually to reduce costs. There are a number of tools available for targeting possible areas of cost reduction, which are discussed in the next section, "Cost Reduction Tools." However, there are several issues to consider before using any specific cost reduction tool.

One such issue is to reduce costs in an area as remote as possible from customers. If a company scrimps on anything that a customer will experience, this can negatively impact customer purchases as well as increase customer turnover. For example, shifting customer service to a country where people speak with a strong accent is not going to improve the customer experience. Conversely, if a cost reduction program begins in the maintenance or accounting departments, management can make a number of mistakes and customers will never notice the difference. However, some prime cost reduction opportunities will certainly be in areas that are very noticeable to customers and cannot be ignored—in these cases, it is best to first test a cost reduction methodology elsewhere to gain experience with it and then roll it out in the areas noticeable to customers.

It is also necessary to select a cost reduction area where someone is clearly responsible for results. A cost reduction that is tied directly back to a specific manager is much more likely not only to be implemented but also to be maintained. Conversely, one should avoid a cost reduction project in an area where there is no clear responsibility for the expense, as is the case in a team or matrix environment. In such situations, it is best to recommend that management assign specific responsibility, and wait for this to happen before proceeding with a cost reduction project.

Finally, a company may find that the real underlying reason why its costs are increasing is that it is growing too fast for its internal systems to keep up with the growth. This could be due to exceptional organic growth, or perhaps a large number of acquisitions. Whatever the reason, it is entirely possible that there is no way to reduce costs at a pace fast enough to keep up with rampant growth. If this is the case, the solution may be to deliberately slow down or even halt the rate of growth. This gives a company time to install more robust systems, train its staff, and hire more people who are sufficiently qualified to handle high transactional volumes. In this case, slower growth may be the only way to quickly rein in expenses.

Cost Reduction Tools

There are a large number of cost reduction tools available, the most useful of which are described in this section. They are mostly based on various

types of financial and operational analysis but also include such simple concepts as idea generation and a variation on the standard budgeting system. Companies have used all of them with considerable success.

5S Analysis

The 5S system is about organizing the workplace in order to eliminate waste. From a cost reduction perspective, it promotes workplace efficiency. As the name of this tool implies, there are five steps, and their names all begin with the letter S. They are:

1. *Sort.* Review all of the items within a work area, retain those needed for daily operations, and dispose of all other items (possibly involving a trip back to the supplies cabinet and/or the Dumpster).
2. *Straighten.* Reposition furniture and equipment to best serve the process flow, and move all other items out of the way.
3. *Scrub.* Clean the area completely.
4. *Systematize.* Establish schedules for repetitively cleaning the area.
5. *Standardize.* Incorporate the 5S system into standard company operations, so that it is performed on an ongoing basis. This should include a formal system for monitoring the results of the program.

A company should not embark on a 5S clean sweep of an entire company at the same time—that would create a great deal of disruption! Instead, this is a methodical process that is used to gradually address all locations, after which it starts over again in a continual cycle.

Benchmarking

Benchmarking is useful for deciding where to begin cost reduction activities. It provides information about the cost levels of other businesses, of other divisions of the same company, or simply of the company for earlier periods. Then match benchmark costs against current results and target unusually high variances for further analysis.

Internal benchmarking against other divisions is particularly useful. Every division is bound to have some best practice area for which clearly identifiable improvements can be copied to other divisions. Further, the corporate headquarters staff can order divisions to assist each other (which is not the case with external benchmarking, where the other company is providing information solely as a favor).

Differences in costs that are highlighted by a benchmarking review can result from a broad range of factors, such as plant layout, automation, employee training, management practices, and cultural issues. Even after a

company identifies and copies every cost reduction technique that it can find at a benchmarking target, some portion of cost differences still may be tied to several residual issues that are not clearly identifiable. When a benchmarking review reaches this point of having no further identifiable practice improvements, then it is time to rebenchmark with some other entity and attempt to spot additional unique practices that the company can copy.

Breakeven Analysis

A product line may generate such minimal throughput (revenue minus total variable expenses) that it cannot pay for the cost of the overhead that is directly linked to it, unless it produces at near-maximum capacity levels. Run a simple breakeven analysis on company operations to see where this problem arises and target cost reductions in those areas where product lines are clearly at risk of not exceeding their breakeven levels.

The breakeven calculation is to divide the related overhead expenses by the throughput margin of the product line. For example, if a product line has an average throughput margin of 40 percent and the related overhead expense is $100,000, then it breaks even at a revenue level of $250,000. If there is only enough production capacity available to create $275,000 of product revenue, then there is very little room for the product line to earn any money.

Check Sheets

The check sheet is a structured form used for the collection and analysis of data. Its most common application is for the collection of data about the frequency or patterns of events. Data entry on the form is designed to be as simple as possible, with check marks or similar symbols. The check sheet is used most frequently in a production setting but can be easily applied anywhere in a company.

For example, what if the accounting manager is trying to increase the efficiency of the cash application process? Her first step is to determine the frequency of various issues impacting the process, so that she can focus her efforts on efficiency improvement. She discusses the project with the cash application staff and uses their input to construct the check sheet shown in Exhibit 1.1. The cash application staff fills it in during a one-week period, resulting in the determination that unauthorized payment deductions are the most frequent problem encountered during cash application, followed by missing remittance detail information. This information can then be used to prioritize efficiency improvement (and the resulting cost reduction) activities.

Reason	Day					
	Mon.	Tue.	Wed.	Thu.	Fri.	Total
Customer double pay		||			3
No remittance advice enclosed	|	𝍸	||	|	||||	13
Pays with multiple checks			|		|	2
Unauthorized deductions taken	𝍸	𝍸||	||||	𝍸||	||	25
Total	6	14	7	9	7	43

EXHIBIT 1.1 Cash Application Check Sheet

Employee Idea Systems

There are only a small number of really large cost reduction concepts, but there are a potentially infinite number of smaller cost reduction possibilities. The best way to obtain these smaller cost reductions is to create an employee idea collection system where a company actively solicits ideas from its employees. It is not unheard of for a company to solicit several dozen ideas per year from every employee and to implement most of the suggestions.

Installing hundreds or thousands of cost reduction ideas is also a significant way to build up a competitive position in an industry because small ideas are much less visible to competitors, so they are much less likely to be copied.

An employee idea system does not necessarily even require a reward system for suggestions. A reward system can require a considerable amount of time to calculate the savings from an idea, which in turn requires a small bureaucracy to hand out rewards. Further, employees will tend to focus on suggesting large-payback ideas only, so a reward system also tends to reduce the number of small-payoff ideas. A better approach is to include ideas generated in each employee's annual review, which can then focus on the quality of ideas generated.

There is a great deal of intrinsic value to an employee to see a suggestion implemented, so it is really more important to have a good implementation system in place than to have a reward system. Implementations should be handled as soon as possible by front-line staff, not routed up through the corporate chain of command for approval. If management requires multiple approvals for each idea, there is more chance that it will be rejected somewhere, which tends to discourage employees from making further suggestions. Also, a long approval process takes more time, money, and paperwork. Instead, the correct approach is to acknowledge receipt

of an idea within one day and to make a go or no-go decision within just a few additional days.

A concern with employee idea systems is that they are very difficult to plan for; one cannot quantify precisely where or when cost reductions will be made, or the amount of savings. However, if ideas are generated and implemented in large numbers, a company can generally estimate the amount of savings that may be generated, based on historical results. In a company with fewer employees, planning for cost reductions will be more inaccurate.

Error Quantification

Any error that results in a scrapped or reworked product or documents piles up costs. A company can create an information tracking system to aggregate error information, which is then summarized into a report such as the one shown in Exhibit 1.2. The report notes the number of incidences of an error event during the measurement period. It also notes the lost throughput of each item. If an item is scrapped, then the associated throughput is lost forever. If an item is reworked, then the cost of the rework labor is offset against the lost throughput to yield a reduced level of throughput. Further, the report indicates the time and labor cost required for rework.

EXHIBIT 1.2 Error Quantification Report

Error Type	Number of Incidents	Lost Throughput per Incident	Total Lost Throughput	Total Rework Time	Total Rework Cost
Rework—Adjust paint gaps	14	$11.14	$155.96	3:30	$70.00
Rework—Cut off excess trim	29	8.23	238.67	5:00	100.00
Rework—Redrill unaligned hole	8	4.88	39.04	2:00	40.00
Rework—Smooth rough edges	11	7.35	80.85	1:00	20.00
Scrap—Broken base unit	10	19.20	192.00	—	—
Scrap—Crushed packaging	4	6.10	24.40	—	—
Scrap—Dented electronics	17	12.05	204.85	—	—

The error quantification report example reveals that the worst scrap issue to investigate is dented electronics, since the company loses the most throughput dollars from this problem. Among the rework issues, the cost of additional labor must be offset against the potential lost throughput to see if rework is worthwhile. The redrilling work costs more to fix than the throughput that would otherwise be lost, so these items can be scrapped instead. The other rework efforts all yield a higher throughput than would be the case if no rework were done.

Fixed Cost Analysis

A common decision point is whether to incur a large fixed cost (such as a high-capacity machine) in order to achieve higher margins through greater production efficiency. The answer, in many cases, is no. The reason is that a large fixed cost increases a company's breakeven point, so that it must make more sales before it can begin to earn a profit. This can be a risky scenario in a volatile market. The issue can even be reversed—should existing fixed costs be eliminated in exchange for variable costs that result in somewhat lower margins? In many cases, yes. It is worthwhile to be somewhat less profitable in exchange for having a more flexible company that can earn a profit over a broader range of revenues and margins. This issue can extend to a variety of nonproduction issues, such as leasing office space rather than buying a building.

Ishikawa Diagrams

Also known as a fishbone diagram or a cause-and-effect diagram, the Ishikawa diagram reveals the causes of a specified event. The diagram, as shown in Exhibit 1.3, has the general appearance of the bones of a fish. The problem to be solved lies at the head. Major bones represent groups of major causes, while minor bones represent subcauses. An Ishikawa diagram is an excellent starting point for a cost reduction analysis, since solving the issues listed along the various branches of the diagram will likely solve the initial problem, which may have been a source of considerable expense.

The exhibit shows the categories of issues causing late product deliveries to customers. The issues are clustered under general categories, such as Policy, Products, and Machine. For example, under the Machine category, incorrect machine setups are delaying the production of goods as well as inadequate preventive maintenance that increases machine downtime. Each of the items on the diagram can be addressed in order ultimately to reduce the incidence of late product deliveries to customers.

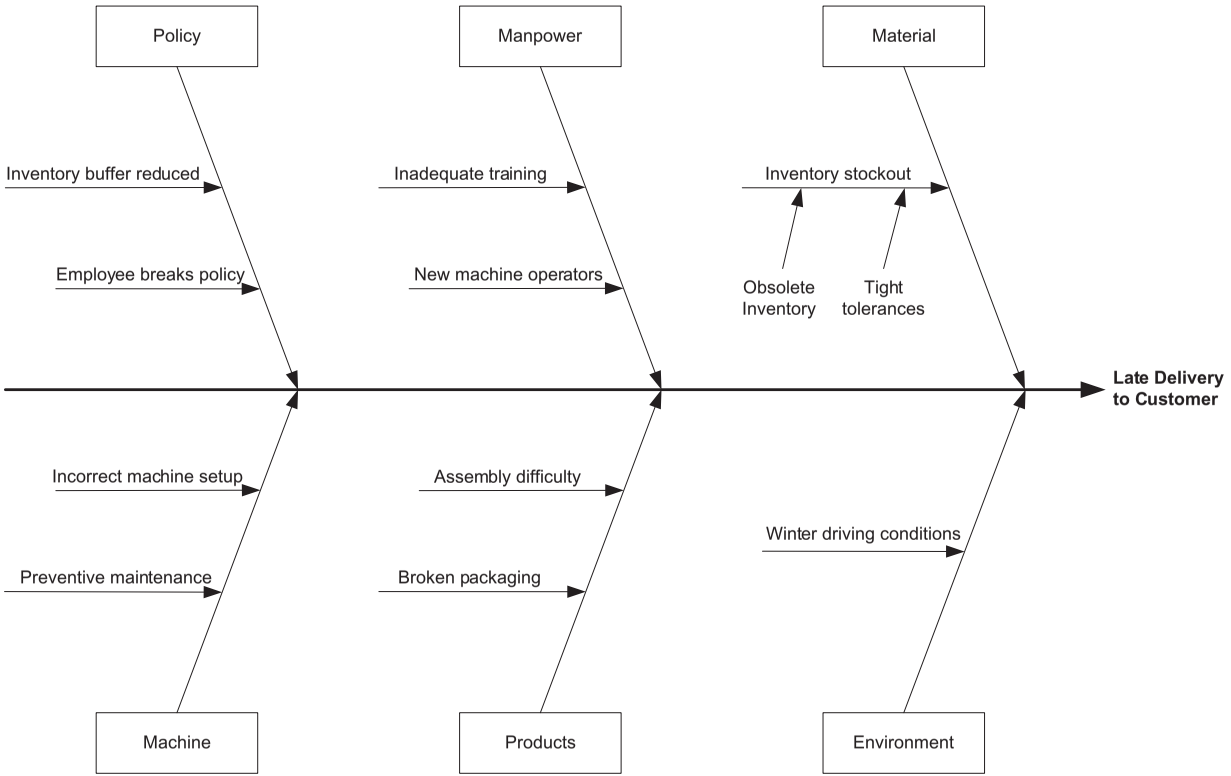


EXHIBIT 1.3 Ishikawa Diagram

There are a large number of major causes under which subcauses can be clustered. Possible headings include environment, equipment, inspection, manpower, materials, maintenance, management, policies, prices, procedures, processing, products, promotions, and suppliers.

Relevant Range Analysis

The management team should be aware of the activity range over which costs apply. In particular, they should know exactly when additional step costs must be incurred to support increased activity levels, the extent of those steps costs, and what alternatives are available to delay or mitigate them.

Total Cost Analysis

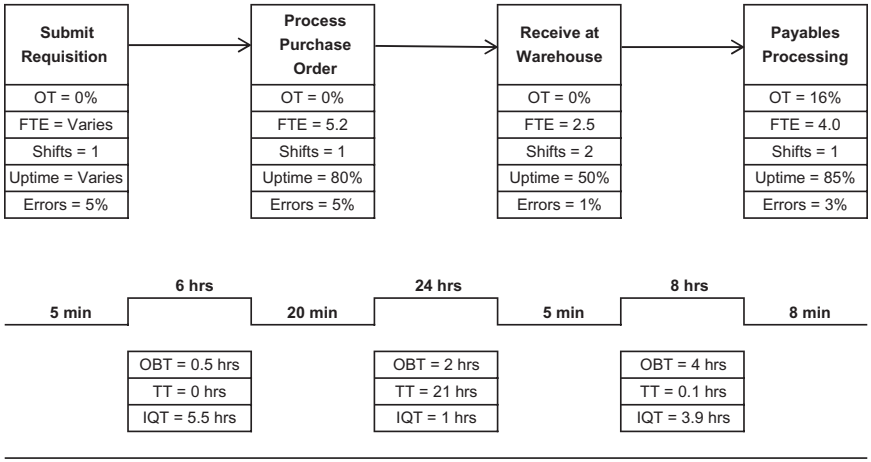
The removal of one cost may trigger the elimination of several other related costs. For example, laying off someone will also eliminate the cost of supplies, cell phones, and travel expense that the employee would also normally incur. There are also step costs that can be eliminated once certain volume points have been reached. For example, the layoff of one person will not also trigger the elimination of a human resources clerk, but laying off 100 employees might very well also eliminate this position.

Value Stream Mapping

Value stream mapping (VSM) focuses on the identification of waste across an entire process. A VSM chart identifies all of the actions required to complete a process while also identifying key information about each action item. Key information will vary by the process under review but can include total hours worked, overtime hours, cycle time to complete a transaction, error rates, and absenteeism.

The VSM chart shown in Exhibit 1.4 addresses the entire procurement cycle, from the initial placement of a requisition through processing of the resulting supplier invoice. Under each processing step, the VSM chart itemizes the amount of overtime, staffing, work shifts, process uptime, and transaction error rate. The chart then shows the total time required for each processing step as well as the time required between steps, and also identifies the types of time spent *between* steps (e.g., outbound batching, transit time, and inbound queue time).

The chart reveals that most of the procurement cycle time is used between processing steps, especially in the transit time of orders from suppliers to the company. If total cycle time is an issue, then a reasonable conclusion would be either to source locally or to spend more for faster delivery services. However, if the emphasis is on speedier in-house pro-



Key:
FTE = Full-Time Equivalent **OT** = Overtime
IQT = Inbound Queue Time **TT** = Transit Time
OBT = Outbound Batch Time

EXHIBIT 1.4 Value Stream Map

cessing, then the chart shows that the purchase order processing stage is the most time consuming; it is also probably a bottleneck operation, given the amount of overtime incurred. Likely conclusions would be to reduce the error rate in the purchasing area by working on a reduction of errors in the upstream requisitioning area (note how the two error rates are identical, since the purchasing staff is likely copying errors from requisitions directly onto the purchase orders), offloading purchasing work with procurement cards, or bolstering capacity by adding purchasing staff.

Another option for shrinking the long cycle time is to have the receiving staff send receiving documents to the payables department more frequently than once every four hours; cutting the outbound batch time in half would eliminate two hours from the total cycle time.

VSM works best in highly focused, high-volume processes where it makes sense to spend time wringing a few seconds out of repetitive processes. Conversely, the analysis effort would be wasted in low-volume areas where the staff constantly switches between multiple tasks.

Waste Analysis

Cost reduction can be performed simply by identifying the various types of waste and then working to reduce them. Here are seven types of waste to be aware of:

1. *Additional processing.* This is any production process that does not directly add value to a product, such as a quality control review.
2. *Defects.* Any processing that destroys or harms production that has already passed through the bottleneck operation is a form of waste, because it eliminates valuable throughput and may require additional expenditures for rework.
3. *Inventory.* Inventory of all types requires a working capital investment, incurs storage costs, and is at risk of obsolescence. It also hides other cost issues, such as production imbalances and poor work practices.
4. *Motion.* Any motion by employees that does not add value is a waste. This includes any equipment setup time.
5. *Overproduction.* Any production exceeding specific customer orders is a waste, because it uses materials and other resources, which then incur storage costs and are subject to obsolescence.
6. *Transportation.* This is the movement of materials between any operations that transform the materials, such as between workstations in a production process. The more something moves, the more opportunity there is to damage materials. Spending on materials handling equipment or conveyor belts is also a form of waste.
7. *Waiting.* Any time when a machine or its operator is waiting is considered a waste of that resource. Waiting can be caused by unbalanced workloads, overstaffing, materials shortages, and so forth. However, analyze this type of waste with care; throughput analysis holds that only waiting at the bottleneck operation is truly a form of waste. (See Chapter 12.)

Some of the waste identified through this type of analysis does not add value but may be needed for legal or safety reasons, and so it cannot be eliminated.

Zero-Based Budgeting

Zero-based budgeting can be quite useful in cost reduction analysis. It requires that a company set up various levels of funding for different budgeted service levels. This typically means that there are budget levels *below* the current expenditure level. Then compare these lower levels of expenditure to actual expenditures to see how service levels will change if a lower level of expenditure is adopted. Creating a multitude of different expense levels within a zero-based budget can be quite time-consuming, so usually there are only a few levels to choose from.

Summary

The key point about cost reduction tools is that no single tool will be sufficient for every situation. Instead, the best results likely will be gained from a combination of tools, which may vary based on which functional area is under review. Also, there are a large number of acknowledged cost reduction tactics that are specific to each functional area of a company—those are listed in the following chapters.

Control charts are used primarily for the analysis of production problems, so they are discussed instead in Chapter 4, "Production Cost Reduction." Another tool is process analysis; it is a large enough topic to warrant two sections of its own, which follow.

Process Analysis

One of the best ways to reduce costs is to fundamentally restructure the processes that a company uses to complete transactions. Many processes are rife with an excessive number of controls, approvals, handoffs, and unnecessary tasks that have gradually built up. It is entirely natural for processes to become more complex over time, as any number of decisions impact what might originally have been a clean and simple process flow. Accordingly, a process analysis team should cycle through a company continually, reviewing every process for streamlining opportunities. Here are some of the issues that they should address:

- *Capture information once.* If a process runs through several people, it is possible that each one in turn collects and enters some of the same information. To avoid this issue, center processes around a central database, as would be available in an enterprise resources planning system, so that information is only entered once and is then available to all subsequent users.
- *Design around value-added steps.* In a typical process, there are only a few value-added steps, along with a number of reviews, controls, reports, approvals, tests, and inspections that do nothing to advance the process. In designing a better process, first focus on a process containing *only* value-added steps and then consider adding the *minimum* number of non-value-added steps.
- *Avoid formal quality review steps.* Any formal quality review activity is a waste of money, since it implies that a sufficient level of quality has not already been built into a process, and so requires extra labor to identify and fix. The solution may not be simple, since it involves error-proofing the entire process prior to a quality review step.

- *Reduce reviews and approvals.* Ideally, there should be no approvals at all, and certainly no more than one. Any additional approvals simply extend the length of a process and waste the time of the person doing the approving. A long string of approvals either indicates that the management team does not trust its employees to handle transactions with minimal oversight or that a number of processing errors in the past have triggered additional reviews. The solution to both problems is to locate the root cause of errors and improve the process flow to the point where errors no longer occur. Then management's confidence in the staff should improve to the point where no approvals are needed.
- *Center the process.* Ideally, a process should be performed by one person, which improves efficiency and also places responsibility squarely on that individual. In those cases where a process seemingly touches on everyone in a company, the solution will be a winnowing out of as many people as possible, shifting most of the work to the smallest number of people, and then reviewing the process again over multiple iterations to continually compress the number of involved employees.

  If there appear to be multiple people around whom a process can center, it is possible that the process should really be split into separate processes, with each one concentrated around a single individual.
- *Focus on the central process flow.* A process may include a variety of processing options, where some transactions must be shunted off to be dealt with differently from the majority of transactions. If so, the primary cost reduction gains will be from streamlining the tasks involved in the primary process flow. Secondary gains will be from entirely eliminating the decision points that shift some transactions off the central process flow. Thus, cost reductions are to be gained by increasing the efficiency of the core process and the volume of transactions running through it.
- *Simplify steps.* Task simplification is central to the reduction of processing errors. It can involve the elimination of processing options, or the elimination of various types of data, or the consolidation or elimination of forms, and so forth.
- *Select the simplest process path.* If a process improvement project yields several possible alternatives for a new process, it is generally best to select the simplest one, even if it is slightly more expensive than the other alternatives. The reason is that more complex solutions either require more oversight now or will in the future, as the process gradually becomes more complex again. If it is possible to adopt the simplest solution now, the odds are good that it will remain simple for a longer period of time.

- *Concentrate on high-cost items.* A process usually contains only a few steps that absorb costs. These few steps are where a cost reduction team should focus its efforts, since there is a greater payoff for eliminating or streamlining these steps.
- *Eliminate wasted time.* There is a great deal of wait time built into most processes, where a processing step sits in a person's work queue for an inordinate period of time, is then processed briefly, and then shifts forward to the work queue of the next person in line. It is not uncommon to experience 99 percent wait times during a process. It is extremely useful to measure wasted time in an existing process and use this information to alter the process flow, usually in the direction of more process centering and smaller batch sizes.
- *Identify and enhance bottleneck flows.* There is a bottleneck in every process, and it is where work tends to pile up. Once identified, either alter the process to reduce the work reaching the bottleneck or increase the capacity of the bottleneck operation.
- *Reduce batch sizes.* If processes flow among multiple people, then specify that document batches be reduced to the smallest possible number before shifting to the next downstream person. This reduces the opportunities for documents to be held up between people, thereby delaying process completion.
- *Introduce automation last.* Automation can be expensive, so automating a clunky process likely means that the existing process will be maintained for the foreseeable future, on the grounds that a large investment has been made in it. A better approach is *first* to streamline a process and *then* to introduce automation once the process appears to be working well, with no other significant cost reductions likely.
- *Install a feedback loop.* Even the best-designed process will generate errors occasionally, so include an error-reporting system in the process, along with a feedback loop that routes this information to the appropriate person for action.

Once a process has been fully redesigned, it is possible that the people performing it are no longer qualified to do so; their jobs may now require more skills than they have. If so, a special training regimen may be needed to bring the staff up to the minimum required skill level. Alternatively, it may be necessary to replace some employees.

Once a process has been improved and implemented, make sure that the same process is being used in all company locations. This may require that people using the new and improved process be sent to other locations to demonstrate the new system. Also, the internal audit staff should schedule a follow-up review to ensure that all locations are using the new system

correctly. Otherwise, a company may find itself with an unwieldy group of disparate processes that all complete the same work with varying degrees of efficiency.

Top Processes to Review

Finally, there is the issue of which processes to select for an overhaul. There are dozens, if not hundreds, of processes to select from, so which ones go first? A process is in need of work if there is a great deal of turmoil around it. Indicators include finger-pointing about who caused an error, high error rates, lots of time researching and correcting errors, a multitude of manager approvals, and evidence that people are working around the process whenever possible. These are all symptoms of a process that touches too many departments and has too high a degree of complexity. It is not difficult to find these processes—just ask the employees.

Process Analysis Tools

There are a number of ways to analyze an existing process to see how it can be streamlined. A good overview of a process flow is the task chart, which shows the sequence of events in a process flow, what type of processing occurs, and the time required for each step. The task chart is very helpful for zeroing in on long-duration process steps that may be causing trouble for users. An example is shown in Exhibit 1.5.

The exhibit shows the steps used in a paper-based purchase requisition and purchase order flow. The steps are listed in their normal sequence, showing the duration and type of activity for each step. The chart makes it clear that there is a high annoyance factor and delay involved with any document approval or document transfer between employees. The other steps are so short that any improvements to them would not greatly reduce costs.

Another way of looking at a process is to see how many times it switches between different departments. The more handoffs there are in a process, the greater the chance for delays and errors. The format shown in Exhibit 1.6 for a simplified sales process reveals that a customer order is handled by no fewer than four departments, which explains why this process is a prime source of errors in many companies.

The process task chart is good for spotlighting specific areas for further investigation but does not provide a sufficient level of detail regarding exactly what activities are occurring. For that level of detail, we use a process cycle time analysis, such as the one shown in Exhibit 1.7. The matrix breaks down processing time into more clearly defined segments.

Task: Complete Purchase Requisition and Purchase Order

Sequence	Time	Symbol	Annoyance Factor	Task Description	Why Done
1	5 minutes		Low	Employee prepares purchase requisition	Relying on employees to inform the purchasing staff of stockout conditions
2	2 minutes		High	Supervisor reviews and approves purchase requisition	Managers want to know what items will be charged against their budgets
3	2 minutes		Low	Employee creates a copy of the requisition and retains it	Purchase requisitions are lost, either in transit to the purchasing department or by the purchasing staff, so employees want to retain a record
4	8 hours		High	Put requisition into interoffice mail, to the purchasing department	Resulting purchase order must be processed by a designated purchasing agent
5	30 minutes		Low	Locate supplier and prepare purchase order	Purchasing agent must source through a preferred supplier and create an authorization document
6	2 minutes		Low	Forward requisition and purchase order to purchasing manager if purchase order total exceeds $10,000	Purchasing manager wants to be assured that large purchases are authorized and placed with preferred suppliers; smaller orders are exempted
7	4 hours		High	Purchasing manager reviews and approves the purchase order, and returns it to the purchasing agent	Completion of review process
8	2 minutes		Low	Purchasing agent creates a copy of the purchase order, attaches the requisition to it, and retains it	Purchasing agent wants a copy of the transaction in case there are questions about it at a later date
9	4 minutes		Low	Purchasing agent creates a copy of the purchase order and sends it to the receiving department	Receiving department needs a copy of the purchase order to match against the delivery when it arrives
10	1 minute		Low	Purchasing agent sends two copies of the purchase order to the supplier	Purchase order triggers action by the supplier

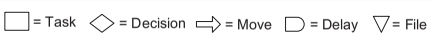


EXHIBIT 1.5 Process Task Chart

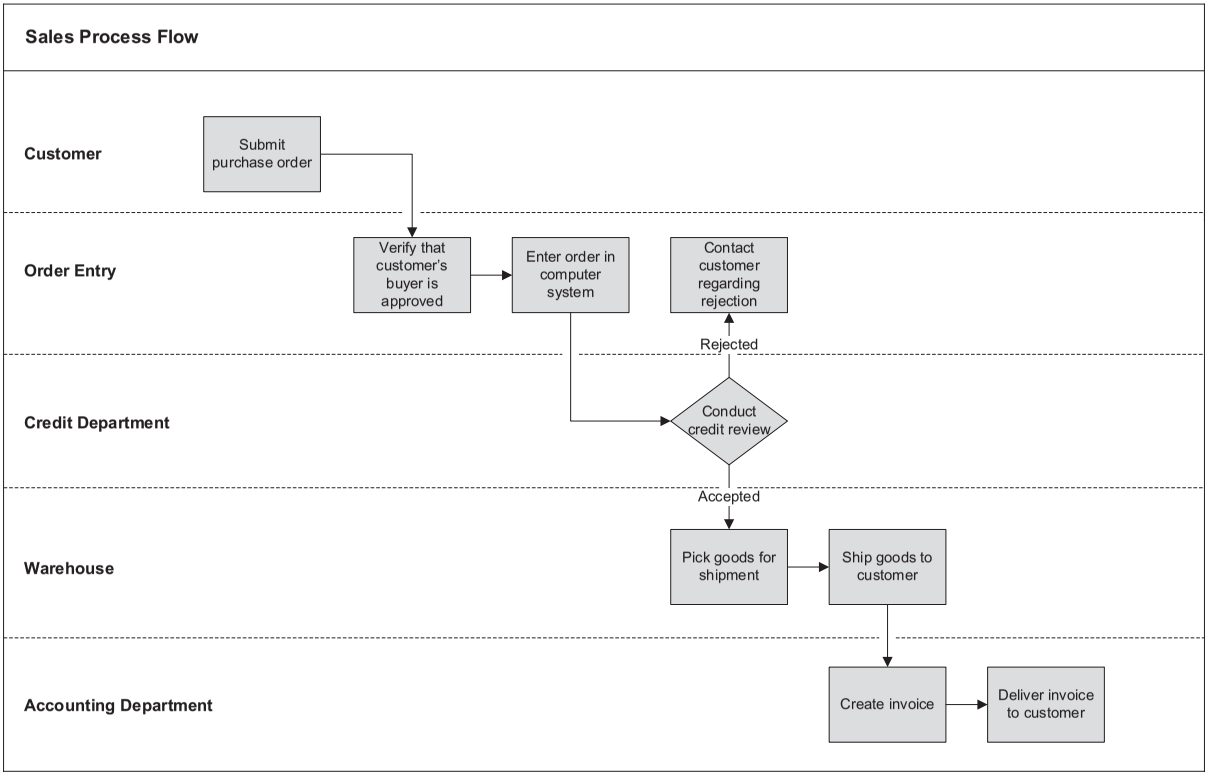


EXHIBIT 1.6 Process Flow across Departments

EXHIBIT 1.7 Process Cycle Time Analysis
Process: Plastic Part Injection Molding and Painting (minutes:seconds)

Sequence	Setup Time	Processing Time	Move Time	Wait Time	Inspection Time	Rework Time	Total Time
1	20:15	:05					20:20
2			:25	33:15			33:40
3					:01	:20	:21
4			:35	45:00			45:35
5	2:30	:05					2:35
6			:35	20:45			21:20
7					:01	:10	:11
8			:50				:50

EXHIBIT 1.8 Cycle Time Analysis

Sequence	Processing Time (hours)	Cycle Time (hours)	Processing Percentage
1	0.6	0.6	100%
2	0.2	0.3	67%
3	0.4	0.8	50%
4	1.0	4.9	20%
5	0.8	1.3	62%
Total	**3.0**	**7.9**	**38%**
Total Percentages	**38%**	**100%**	

The exhibit reveals that the wait times in processing steps 2, 4, and 6 are responsible for nearly all of the time in the process and so are worthy of further analysis.

As just noted, the wait time can be an extremely high proportion of the total process time. In Exhibit 1.8, the actual processing time for five steps is listed in the second column, with total cycle time (processing time plus wait time) in the third column. Processing time is then divided by cycle time in the fourth column. A very low percentage reveals the presence of an inordinate amount of wait time, which then becomes a target for more detailed analysis.

The cycle time analysis in Exhibit 1.8 reveals that the overall processing time during the process is 38 percent of the total, which means that 62 percent of the process is composed of wait time. The bulk of the wait time

is centered on the fourth step in the sequence, which has a processing time percentage of only 20 percent. This would be an excellent spot to begin further investigation into compressing the cycle time.

Key Cost Reduction Questions

Before implementing a cost reduction, one should address a series of questions to see how the change will impact the organization. Just because there is a negative outcome to one or more of these questions does not mean that the change should be avoided; however, it does mean that management is now aware of the issue and can make any adjustments it feels necessary to counteract the problem. The questions are:

- *Will customer service levels decline?* This issue is listed first because it is important for revenues, customer satisfaction, and customer turnover. A negative response from management should not yield an automatic rejection of a proposed cost reduction, however. Instead, additional consideration should be given to the extent of the resulting service level decline and how much that decline will matter to customers.
- *Will it impact the lifetime value of customers?* In other words, will the cost reduction either increase customer turnover or reduce the profit from their purchases? If so, then the cost reduction needs to be so massive that it clearly offsets the projected customer losses. In most cases, a yes answer will provide sufficient grounds to cancel a proposed cost reduction.
- *Will it impact core functions?* This question is critical. A company should pare costs from a key company function only if the expenses are clearly extraneous. If anything, company resources should be flowing *into* these areas.
- *Will it impact product quality?* A yes answer does not automatically cancel the related cost reduction. One must determine if the current quality level matches customer expectations or if the design robustness is actually greater than needed.
- *Will employee skills be affected?* This question is targeted at reductions in training expenditures. The analysis should include a review of exactly which skills will be impacted and how critical they are to the company's long-term success.
- *Will there be a related exit cost?* There may be a variety of expenses that must be recognized as a result of a cost reduction, such as severance pay, writing off assets, or paying a termination fee to a business partner. These costs should have been included in the initial cost reduction analysis already, but the question is listed here to ensure that it is addressed.

Some variation on these questions can be included in a standard company checklist of items to be discussed before management approves a cost reduction.

Cost Reduction Reports

A well-organized cost reduction analysis project should start with a general overview of the target area that results in a graphical presentation of potential cost reductions. The format shown in Exhibit 1.9 is a good layout, showing the potential cost reduction impact of numerous projects across the bottom axis and implementation difficulty on the vertical axis. Cost reductions in the lower right corner are low-hanging fruit that generate significant returns in exchange for a modest effort. Conversely, items in the upper left corner require a great deal of effort and produce minimal returns. This format is a good guideline for deciding which projects to address first and which can safely be delayed.

In Exhibit 1.9, the commission restructuring in the upper left corner is projected to have such a low payback and high difficulty of implementation that it is not worth doing, whereas the procurement card program is highly worthwhile, since it has the reverse characteristics.

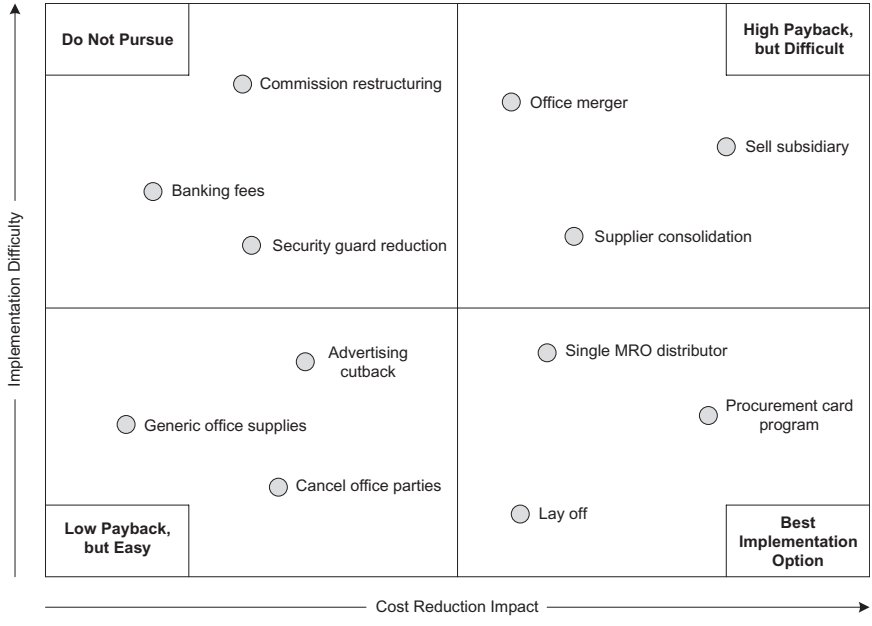


EXHIBIT 1.9 Cost Reduction Payoff Matrix

EXHIBIT 1.10 Cost Reduction Risk Matrix

	Cost Overrun	Customer Turnover	Extended Implementation	Management Support	Project Failure
Advertising cutback	1	4	3	2	1
Layoffs	2	1	2	4	1
Office merger	3	1	4	5	4
Single MRO distributor	1	1	4	1	2
Supplier consolidation	2	1	5	1	3
Scoring	1 = low risk 5 = high risk	1 < 1 month 5 > 1 year	1 < 1 month 5 > 1 year	1 = high 5 = low	1 = low risk 5 = high risk

A variation on the cost reduction payoff matrix is one that itemizes a number of additional factors, such as the risk of project failure, implementation duration, and level of support. If any prospective project has a high risk score in any category, then the project manager should either consider alternative projects or work on risk mitigation strategies. A sample risk matrix is shown in Exhibit 1.10. In the exhibit, the riskiest project appears to be the office merger, which contains three high-risk scores, while the single maintenance, repair, operations (MRO) distributor option is the safest, with four low-risk scores.

Exhibits 1.9 and 1.10 provide only an overview of potential cost reduction projects. The next step in an organized cost reduction system is to generate greater detail regarding potential reductions. The format is shown in Exhibit 1.11, which begins with the general topics already shown in the cost reduction payoff matrix, and then notes and quantifies specific opportunities. The matrix is split into two parts, with those projects estimated to have low levels of implementation difficulty listed at the top and those with more difficult implementation difficulty listed at the bottom.

Another way of stating Exhibit 1.11 is to create a before-and-after income statement showing the expected impact of the cost reduction program. An example, using all of the Exhibit 1.11 cost reductions, is shown in Exhibit 1.12. This can be an extremely effective way to convince senior management to support cost reductions, especially when they see the improvement in net profit, as shown in the example.

Once proposed cost reductions have been selected from the list in Exhibit 1.11, a tracking report is needed to show the progress of the reduc-

EXHIBIT 1.11 Cost Reduction Itemization Matrix

Topic Area	Opportunity	Action	Implementation Difficulty	Cost Reduction (000s)
Advertising cutback	All of advertising is spent on NASCAR sponsorship	Drop sponsorship and switch to mix of Internet and magazine advertising	Low	$380
Cancel office parties	Currently have Christmas and summer parties for 14 offices	Eliminate all summer office parties	Low	170
Generic office supplies	Using brand names for 140+ types of office supplies	Standardize on generic office supplies	Low	30
Layoff	10% of production staff is currently idle	Conduct a layoff of 5% of the production staff, leaving the remainder on staff to maintain capacity	Low	490
Procurement card program	Purchase orders used for virtually all purchases	Implement a procurement card program, and mandate its usage for purchases under $500	Low	640
Single MRO distributor	Currently use 15 MRO distributors	Centralize orders and shift to standard generic supplies	Low	520
		Total Cost Reduction		**$2,230**

(Continued)

EXHIBIT 1.11 *(Continued)*

Topic Area	Opportunity	Action	Implementation Difficulty	Cost Reduction (000s)
Banking fees	Currently paying account fees for a separate bank account for each office, and not aggregating cash for investing purposes	Switch all accounts to a single bank, and roll all cash into an investment account, using zero-balance accounts	High	40
Commission restructuring	Junior-level base pay is 25% higher than comparable rates in the market	Drop base pay to market rate for all new hires	High	75
Office merger	The Denver and Boulder offices service approximately the same group of customers	Eliminate the Boulder office, sublease the space, and shift staff to the Denver office	High	390
Security guard reduction	Currently have evening on-site security guards for all 14 offices	Switch to a private contractor that patrols the area periodically	High	85
Sell subsidiary	The Wynona Brewery is the only brewery still owned by the company	Sell the subsidiary	High	790
Supplier consolidation	Have over 1,000 suppliers for 5,400 stock keeping units	Consolidate the supply base to 300 suppliers, and realize a 3% overall cost reduction	High	500
		Total Cost Reduction		**$1,880**

EXHIBIT 1.12 Before and After Income Statement (000s)

	Prior to Reductions	Reductions	After Reductions
Sales	$79,400		$79,400
Cost of goods sold			
Sales compensation	3,850	$75	3,775
Materials	34,000	1,020	32,980
Labor	19,850	490	19,360
Total cost of goods	57,700		56,115
Gross margin	21,700		23,285
Administrative expenses			
Advertising	1,700	380	1,320
Events	410	170	240
Leases	5,460	390	5,070
Salaries	6,010	725	5,285
Supplies	830	30	800
Other	1,730	40	1,690
Total administrative	16,140		14,405
Gain on asset sale	0	790	790
Net profit	**$5,560**	**$4,110**	**$9,670**
Net profit percentage	**7%**		**12%**

EXHIBIT 1.13 Cost Reduction Status Report (000s)

Expense Category	Cost Reduction Goal	Identified Cost Reductions	Completed Cost Reductions	Achieved Reduction Run Rate
Direct labor	$490	$0	$0	$0
Direct materials	0	0	0	0
Administration labor	640	600	340	220
Production supplies	520	120	40	40
Supplies	200	180	180	140
Advertising	380	280	100	100
Totals	$2,230	$1,180	$660	$500

tion project. The report shown in Exhibit 1.13 itemizes the expense categories to be impacted as well as the progress of cost reductions. Of particular interest is the last column, which summarizes the achieved run rate of lowered costs that a company can expect to continue to experience in the future.

The cost reduction status report reveals that the layoff noted in Exhibit 1.11 has not yet taken place, since that would have appeared in the direct labor category. The remaining programs have all been initiated but not yet completed. In fact, the completed cost reductions currently comprise only 30 percent of the total cost reduction goal, so management clearly needs to monitor the situation closely for some time to come.

The reports shown here start at the very high-level cost reduction payoff matrix, add an analysis of project risk, and then drill down to individual cost reduction projects and the continuing progress of those projects. This level of reporting is needed to give management a complete top-to-bottom view of a cost reduction campaign.

Metrics

There is no single metric to monitor for a cost reduction program. Instead, a measurement system must be created for each type of cost reduction, showing historical costs and related activities, and then following the same metrics in the future, to warn of any backsliding in cost reductions. These metrics should be linked with a number of *failure metrics*. A failure metric reveals if a key type of performance is failing as a result of a cost reduction. For example, switching to lower-quality raw materials can be linked to a warranty claims failure metric; if warranty claims go up substantially as a result of the lower product quality, management should reevaluate the cost reduction program. Examples of other failure metrics are service delivery times and customer satisfaction ratings.

When setting up historical metrics for a cost reduction project, the costs incurred during the past 12 months are sufficient; they reflect the most recent activity as well as cost variations over a full-year cycle. Any metrics farther back in time likely reflect different activity levels and business conditions, and so are not relevant to the current cost structure.

Finally, the best measurement system is one that drills down to the lowest cost center or profit center level. Since costs generally are eliminated at the individual location and related general ledger subcode level, this type of highly localized metric will generate the best information about the success of a cost reduction effort.

Summary

This chapter has addressed the economics of cost reduction as well as other reasons for engaging in an ongoing program of cost reduction. We have also noted the general work flow to be used when engaging in a cost

reduction project, and some of the tools that are available for this work. However, not all tools are applicable to all cost reduction areas. The next chapters reveal that different types of analysis are applicable to different expenses. For example, the use of a pull system is critical for minimizing an inventory investment, whereas throughput analysis is quite useful for evaluating fixed asset purchases, and a simple laundry list of options should be incorporated into an employee benefits review. Further, cost reductions in spend analysis are closely tied to supplier consolidation, while maintenance, repair, and operations spending calls for close cooperation with a preferred distributor. In short, there is no easy way to reduce expenses; doing so requires knowledge of a broad set of tools.