

# THE MANAGEMENT ACCOUNTANT'S ROLE IN Six Sigma

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Over the past 20 years, Six Sigma has evolved into a powerful and effective methodology that has helped large and small manufacturing and service companies solve problems, improve processes, delight customers, and save (as well as make more) money. The philosophy originated with Motorola in the early 1980s when the company used the Six Sigma discipline to improve products, reduce costs, and increase profits. Today it's the accepted industry norm in the U.S., and many international companies are also incorporating it into their business culture. In conjunction with this, the list of Six Sigma companies, books, journals, websites, seminars, consultants, and certifications continues to grow. In fact, a Yahoo!® search for "Six Sigma" will generate more than 800,000 hits, while a Google™ search yields just under a million. One of the reasons Six Sigma is so successful is that it spans every area of a company (manufacturing, R&D, customer service, information technology, accounting, finance, maintenance, etc.) and every personnel rank (from entry-level positions to the CEO). Some examples of typical Six Sigma projects are:

- ◆ Reducing scrap in a ball bearing manufacturing plant and capacitor assembly plant;
- ◆ Identifying and reducing unnecessary spare parts inventory for a paper cup plant;
- ◆ Reducing defects and product variation in a textile finishing plant, thus increasing the

percentage of material that meets customer requirements;

- ◆ Reducing lead times for product development and scale-up in a pharmaceutical company;
- ◆ Eliminating unnecessary product testing in a fiber plant;
- ◆ Reducing hospital billing errors;
- ◆ Reducing shipping errors in a rubber plant;
- ◆ Increasing machine efficiency in a paper plant;
- ◆ Reducing the number of customer-service and order-entry errors in a box plant;
- ◆ Streamlining the appropriation request process for new technology and equipment in an automotive plant; and
- ◆ Reducing the waiting time for notification of bank loan approval.

Six Sigma offers a tremendous career opportunity for management accountants and financial analysts who are willing to undertake principal roles in the process. Unfortunately, many organizations assign them the task of “blessing the numbers” without allowing them to become intricate members of the process. This situation needs to change, and we hope it will, but there are some challenges that financial professionals must overcome to be key contributors and deliver Six Sigma’s benefits to their organizations.

In addition to giving an overview of Six Sigma and its components, we include several examples based on real situations we have encountered during 15 years of consulting that are intended to help clarify the management accountant’s role. We intentionally avoid any reference to specific companies and dollar savings in order to emphasize the benefits of accountants’ active participation in the process. For those of you who want more information, see the brief list of references in the sidebar on p.38. This list is by no means exhaustive—it just includes some of the material we find useful.

### COMPONENTS OF SIX SIGMA

Six Sigma has several key components that differentiate it from other improvement philosophies. For example, it utilizes a structured, project-based approach to process improvement and making money. Companies or organizations select Six Sigma projects to align with their corporate/organizational objectives. An executive-level Six Sigma committee identifies potential projects and then selects the ones to pursue that best support strategic company goals and initiatives. The goal of each project is

to improve the associated business processes so that the user obtains significant bottom-line profitability and customer satisfaction. Examples of business processes include development, product procurement, manufacturing, logistics, sales, marketing, and distribution. The anticipated costs and expected benefits are determined for each project, and company resources are allocated toward process-improvement efforts that have the best chance of making a significant, measurable impact on profits or customer relationships.

Six Sigma projects use the team approach, with teams being led by competent, trained experts from inside the company, typically called black belts. (Black belts are permanent positions, while green belts, also trained experts who perform the same functions, are temporary positions.) Black belts receive extensive training in process-improvement and problem-solving techniques, quantitative and qualitative analytical skills development, team building, project management, group dynamics, and change management. Black belts can be “certified” by the

## Six Sigma

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American Society of Quality and other organizations by completing the training, leading a successful project, and demonstrating core subject knowledge on an examination. Green belts generally receive less rigorous training in each area, and they are coached by black belts while working on Six Sigma projects. Teams generally complete projects within six months: Their strategy is to focus on a business process, improve it, and then move on to another project. Each project they work on is important to the organization, has high visibility, and has a large potential impact on profits and customer satisfaction. Project objectives are quantifiable, and teams record and monitor the performance of key metrics.

A common thread through all Six Sigma projects is the emphasis on data. Phrases such as “We feel that...” or “We suspect that...” aren’t allowed. Instead, phrases such as “The data shows that...” and “Statistical analysis of the data supports that...” replace them.

This emphasis on data and measurement led to the

methodology that has made Six Sigma so successful—the DMAIC approach to process improvement. DMAIC stands for Define-Measure-Analyze-Improve-Control. Each project follows this approach from beginning to end, regardless of whether it involves a manufacturing process, an administrative process, or a support process.

◆ **In the Define phase**, a team clearly identifies the suppliers, process inputs, process activities, process outputs, and customers; establishes baselines and benchmarks; and sets and agrees upon goals and measures of success.

◆ **During the Measurement phase**, the team studies and evaluates relevant measurement systems to determine if they are capable of measuring key input variables (raw material characteristics and process conditions such as temperatures, speeds, pressures, and flow rates) and output characteristics (product dimensions, customer-defined specifications, and product performance) with the desired precision and accuracy. If they aren't, then the team will work to improve the related measurement systems before proceeding with the project.

◆ **During the Analysis phase**, the team performs graphical and statistical analyses on historical and newly obtained data to develop preliminary hypotheses for improvement. The team identifies “root causes” of problems and “enablers” of poor performance that need to be corrected.

◆ **In the Improve phase**, the team designs and conducts experiments to find the optimal conditions needed to operate the process. Improvement requires change, and the correct changes are determined through statistically designed experiments where process inputs or system components are varied and the resulting effects on process outputs (related to quality, cost, and customer requirements) are observed and measured. If the results are favorable, process conditions are changed to these optimal levels.

◆ **The team maintains these optimal conditions during the Control phase** where audits and control systems sustain the improvements. No project is deemed “completed” until there are sufficient time and evidence to verify that the desired results have been obtained and maintained.

## A VITAL ROLE

Management accountants and financial analysts play vital roles in all phases of Six Sigma. Their primary function is to oversee the integrity of the financial and cost data, but their contributions should extend beyond this. In fact, their role should begin before a company initiates a Six Sigma project.

## Seeking Opportunities

It is absolutely essential that management accountants and/or financial analysts are part of the Define phase. One of their most important roles is to be ever vigilant for opportunities that warrant Six Sigma-type projects since they are in the best positions to observe and to document excessive costs and waste. Management accountants should also be part of the project selection process to verify that projects have the desired potential impact. As part of this role, they perform gap analyses to compare existing conditions with desired or “best case” conditions to determine the most realistic project expectations. One of their major contributions is to identify and help their companies avoid projects where the expected savings won't justify the investment of Six Sigma resources. The process is successful because Six Sigma projects are subjected to this realistic up-front screening process, and companies don't waste resources on projects with low potential payback.

For example, when reviewing waste reports, a cost clerk in a paper cup plant discovered that the cup department consistently reported “negative” paper waste. This implied that the output of the department exceeded the combined inputs, which isn't possible in a cup plant. The report indicated that more cups were produced than possible based on the amount of paper stock consumed. The clerk realized that *all* the waste data was now suspect, so the company initiated a Six Sigma project to investigate and correct the waste reporting system. The team discovered that the methods used to predict paper waste and cup production hadn't been updated when new equipment was purchased several years before, so the company had been using incorrect costing and pricing data for at least two years.

In another example, a company that produces foam rubber for gymnastic mats, water-ski vests, and helmet linings formed a Six Sigma team to streamline their customer-service/order-entry process. Customers had complained that the ordering process was unfriendly and time-consuming. As part of the analysis phase, an order-entry clerk analyzed historical price quotes and discovered that some sales associates were using incorrect pricing information for all products, which was costing the company thousands of dollars in lost revenue. The Six Sigma team standardized the order-entry process (with the correct prices), trained the sales and order-entry associates to correctly use the new procedure, and implemented a recurring audit of the process.

## Evaluating the Measures

During the Measurement phase, management accountants and financial managers should take the lead in evaluating the measurement systems the team will use to gather accurate and precise data for the project. Here the team should also identify the key indicators of success and initiate tracking systems. Since all Six Sigma projects have a direct impact on the bottom line, the team must be able to measure the project's contribution to it. This requires that the management accountants develop and maintain a set of appropriate tracking metrics.

In one instance, a Six Sigma team in a textile plant was evaluating different techniques of making machine changeovers, and the financial analyst needed to determine the true cost savings of the alternative methods. In some cases a reduction in changeover time has no effect on the bottom line, and this was such a case. Although the team found a quicker method for making changes, there was no bottom-line savings or workforce reduction. Thus, the analyst kept them from reporting an invalid savings potential to management, and the team directed their attention to other, more fruitful areas.

## Monitoring Costs and Savings

Once a company undertakes a Six Sigma project, management accountants should work with team members to monitor the project's costs and the expected savings. With their eye for detail and ability to work with and interpret data, financial professionals should be active team members during the Analyze phase. Yet some organizations involve their management accountants only on the periphery, providing data and information when asked to do so. Companies should avoid this approach as it's a missed opportunity to use the expertise of their financial professionals. For this reason, we recommend that man-

agement accountants and financial managers pursue the training to become Six Sigma black belts. Our experience indicates that they make excellent black belts and project team leaders. They tend to have the training and ability to add structure to chaos and create well-defined problem statements, stay on track and keep others focused on the projects at hand, understand data and communicate what the numbers "say" to others, think objectively about potential solutions, master the analytical and statistical techniques of problem solving, understand the importance of control systems, and develop and maintain control systems.

One such example is an accountant-led team in a medical clinic. The clinic had initiated the Six Sigma process and trained an accountant as its first black belt. One of the clinic's initiatives was the reduction of billing errors. By examining a large sample of patient bills for the past year, the team found that billing errors were highly correlated with the type of medical procedure and the attending physician. Armed with these facts and knowledge, the clinic took corrective actions (simplifying forms and conducting training workshops) to significantly reduce the frequency of billing errors.

## Verifying Improvements

As the term implies, things should get better during the Improvement phase. In this stage, accountants need to verify and document that improvements actually occur, and they need to quantify the net effect. They should perform statistical and financial analyses to validate that the results are statistically significant and not due just to random variation. Many accountants have studied experimental design and regression analysis and are experienced in implementing them. These tools and knowledge form the foundation of the Improvement phase.

Yet even when Six Sigma projects fail to achieve management's expected savings, the results are still beneficial. For example, one Six Sigma team was evaluating a \$400,000 equipment purchase in a capacitor assembly plant. They conducted experiments with the equipment and concluded that it wouldn't provide the expected cost savings and quality benefits. In this case, the team was successful in helping the company avoid an unnecessary and uneconomical major expense. Without the Six Sigma process, management would have purchased the equipment only to be disappointed by its poor performance.

## Maintaining Control

No Six Sigma project is complete until a team has the

### FOR MORE INFORMATION

Many companies we talked with said they used these books while implementing Six Sigma, and we, too, have found them useful. We hope they serve as a starting point for your research.

Peter S. Pande, Robert P. Neuman, and Roland R. Cavanagh, *The Six Sigma Way*, McGraw-Hill, New York, N.Y., 2000.

Subir Chowdhury, *The Power of Six Sigma*, Dearborn Trade Publishing, Chicago, Ill., 2001.

Forrest W. Breyfogle, *Implementing Six Sigma*, Wiley, New York, N.Y., 2003.

George Eckes, *Making Six Sigma Last*, Wiley, New York, N.Y., 2001.

Control phase working. Before the team completes a project, the management accountants should ensure that a system is in place to track the savings. More importantly, the system should also monitor and maintain control so that the company can sustain the gains. Control involves more than traditional

statistical process control. Accounting control tools such as audits and check sheets are necessary to ensure sustainability of the improvements. The company may need to take corrective action if it fails to maintain the gains.

A computer chip manufacturer offers a good example. The company had used the Six Sigma approach to improve its forecasting and scheduling system. During the control phase, the team used a forecasting tracking signal to monitor performance. After more than a year of successful forecasts, the signal indicated that the forecast methodology was no longer appropriate. Business conditions had changed dramatically, demand had declined, and competition had increased. Corrective action required that the team revise and update the forecasting system to consider the new business environment.

## CHALLENGES

As with any endeavor, participants face challenges with Six Sigma. The main one for management accountants is that, at first, every problem will look like a Six Sigma project. Management accountants should perform the necessary “gatekeeper” analysis and initiate only those projects that meet the Six Sigma guidelines, which include criteria regarding potential savings, customer impact, expected time for completion, required resources, degree of difficulty, and chance of success. Companies often have a tendency to overestimate potential savings and underestimate the required resources, including time. Management accountants and financial managers can provide a sense of realism during the project-selection and goal-setting phases.

As projects get under way, the Hawthorne effect often occurs. That is, things tend to improve in the short term, but there is no real, lasting change. This often causes a Six Sigma team to claim success too quickly before the company can sustain the improvements. Financial professionals shouldn't allow the team to claim success until it has verified that the improvements can be sustained, and some companies require that a year of sustainability be achieved before the project is ruled a success.

In one case, a company claimed early success. An automotive fabric supplier said it had solved a color-fastness problem after three successful production runs. It

shipped dyed fabric from six subsequent runs to their customer, only to find out later that the problem reoccurred during the fourth run. The customer returned all the fabric and cancelled future orders.

Along the same lines, management accountants frequently have the difficult task of explaining to management that, even though the process has improved and the project is successful, the company won't realize immediate savings but will in future reporting periods. Knowing that a company wants to hear that savings are coming, accountants need to be up front and inform management about realistic expectations.

## FORECAST

Six Sigma, or something similar to it, is here to stay as companies continue to report that it saves them millions of dollars annually. Management accountants and financial managers should embrace its philosophy and methodology and strive to become a Six Sigma resource for their organizations. If their company doesn't offer Six Sigma training, many other organizations, universities, or institutes do provide Six Sigma black belt and green belt training and certification.

Becoming involved in Six Sigma is a proactive step that benefits both organizations and their management accountants. Organizations benefit because management accountants are often in the best place to identify needs since they see and track costs, material usage, and waste for their companies from the input stage, through conversion, to the output stage. They are also capable of providing excellent support and leadership during the Six Sigma processes. Management accountants benefit because their understanding of the tools and concepts of Six Sigma enhances their value to the company, which, in turn, improves their job security and marketability. In short, Six Sigma and management accountants create a win-win situation for all involved. ■

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