

CHAPTER 2

Benchmarking Fundamentals

Benchmarking. Best practices. Competitive analysis. All these terms are used in business today. But are they just buzzwords, or do the words have real meaning? Are they useful tools that can be used to improve business practices today? Let's begin with some definitions.

The Language of Benchmarking

Benchmarking and Best Practices

Xerox Corporation defines benchmarking as follows:

The search for industry best practices which lead to superior performance.

To understand this definition completely, we must first be clear what is meant by *best practices*. They are practices that enable a company to become a leader in its respective marketplace. However, Best Practices are not the same for all companies. For example, if a company is in a declining market, in which the pressures are to maximize profits with a fixed sales volume, one set of best practices might allow market leadership. However, if the company is in a growth mode with profits dictated by gaining rapid market share, a different set of best practices would be appropriate. Therefore, *best* is determined by business conditions, not by a fixed set of business practices.

The second key term in the Xerox definition is superior performance. Many companies use benchmarking to be as good as their competitors. However, a company can gain very little if its goal for benchmarking is merely to achieve status quo. Benchmarking is a continuous improvement tool that is to be used by companies that are striving to achieve superior performance in their respective marketplace.

An alternative definition for benchmarking is as follows:

An ongoing process of measuring and improving business practices against the companies that can be identified as the best worldwide.

This definition emphasizes the importance of improving, rather than maintaining the status quo. It addresses searching worldwide for the best companies. Most marketplaces have international competitors. It would be naive to think that best practices are limited to one country or one geographical location. Information that allows companies to improve their competitive positions must be gathered from best companies, no matter where they are located.

Companies striving to improve must not accept past constraints, especially the “not invented here” paradigm. Companies that fail to develop a global perspective will soon be replaced by competitors that had the insight to become global in their perspective. In order to make rapid continuous improvement, companies must be able to think outside the box that is, to examine their business from external perspectives. The more innovative the ideas that are discovered, the greater the potential rewards that can be gained from the adaptation of the ideas.

A third perspective on benchmarking states:

Benchmarking sources “Best Practices” to feed continuous improvement.

This statement adds another dimension to benchmarking, that of having an external perspective. Research shows that major innovations in any business sector come from an external sector and are adapted to improve the practices of the company. In today’s competitive business environment, the need to develop this external perspective is critical to survival.

Still one other perspective defines benchmarking as the process of continuously comparing and measuring an organization with business leaders anywhere in the world to gain information that will help the organization take action to improve its performance. The common thread of studying other companies to gain information that allows the company to become more competitive is clear. Unless a company clearly understands the processes and procedures that allow a company to become the best, little value is derived from benchmarking.

Competitive Analysis

The terms *benchmarking* and *competitive analysis* are often confused. Benchmarking researches external business sectors for information, whereas competitive analysis shows only how firms compare with their

competitors. A competitive analysis produces a ranking with direct competitors; it does not show how to improve business processes.

Benchmarking provides a deep understanding of the processes and skills that create superior performance. Without this understanding, little benefit is achieved from benchmarking. Competitive analysis is less likely to lead to significant breakthroughs that would change long-entrenched paradigms of a particular market segment. Business paradigms tend to be similar for comparable businesses in similar markets. While competitive analysis often leads to incremental improvements for a business, breakthrough strategies are derived from taking an external perspective.

During the past twenty years, competitive analyses have helped companies improve their respective market positions. Benchmarking then takes over where this opportunity for improvement ends. Benchmarking enables companies to move from a parity business position to a superiority position. Observing best practices can help any company.

Another difference between benchmarking and competitive analysis is the type of data gathering required. Competitive analysis often focuses on meeting some specific industry standard. All that may be required is meeting some published number. By comparison, benchmarking focuses not on a number, but on the process that allows such a standard to be not only achieved, but also surpassed. Process enablers and critical success factors must be clearly understood for any permanent improvement to be achieved and sustained. This understanding will require extensive data collection, both internally and from the benchmarking partners.

Enablers

Enablers are a broad set of activities or conditions that help to enhance the implementation of a best business practice. An essential part of a true benchmarking approach is analyzing the management skills and attitudes that combine to allow a company to achieve best business practices. This hidden narrative is as important during the benchmarking exercise as are the visible statistical factors and the hard processes.

The enablers, then, are behind-the-scene or hidden factors. They allow the development or continuation of best practices. Examples include leadership, motivated workforces, management vision, and organizational focus. Although these factors are rarely mentioned by specific statistics, they have a direct impact on the company's quantified financial performance. They lead to a company's exceptional performance. Note that enablers are relative, not absolute. In other words, they are not perfect; they too can be improved.

Enablers, or critical success factors, can be found anywhere. They do not know industrial, political, or geographical boundaries.

How does one company compared itself to another by enablers? It starts with an internal analysis. For any company to be successful, it must have a thorough knowledge and understanding of its internal processes. Otherwise, it would be impossible to recognize its own differences with its benchmarking partners. The company would not be able to recognize and integrate the differences and innovations that are found in best practice companies.

Defining Core Competencies

As a continuous improvement tool, benchmarking is used to improve core competencies, the basic business processes that allow a company to differentiate itself from its competitors. A core business process may have an impact by lowering costs, increasing profits, providing improved service to a customer, improving product quality, and improving regulatory compliance.

Several authors have defined core competencies for businesses. In his 1997 text *Operations Management*, Richard Schonberger defines core competencies as a key business output or process through which an organization distinguishes itself positively. He specifically mentions expert maintenance, low operating costs, and cross trained labor.

Gregory Hines, in his text *The Benchmarking Workbook*, defines a core competency as a key business process that represents core functional efforts and are usually characterized by transactions that directly or indirectly influence the customer's perception of the company. He further lists several processes. They include:

- Procuring and supporting capital equipment
- Managing and supporting facilities

The maintenance function directly fits his definition of a core business process.

In the American Productivity and Quality Center's text *The Benchmarking Management Guide*, core competencies are identified as business processes that should impact the following business measures:

- Return on net assets
- Customer satisfaction
- Revenue per employee
- Quality
- Asset utilization
- Capacity

Again, the maintenance function in any plant or facility fits this definition.

Other sources point to a core competency as any aspect of the business operation that results in a strategic market advantage. The maintenance process in any company provides this advantage in many ways. These include enhancing any quality initiative, increasing capacity, reducing costs, and eliminating waste.

Maintenance and ROFA

The investment a company makes in its assets is often measured against the profits the company generates. This measure is called *return on fixed assets* (ROFA). It is often used in strategic planning when a company picks what facility to occupy or the plant in which to produce a product.

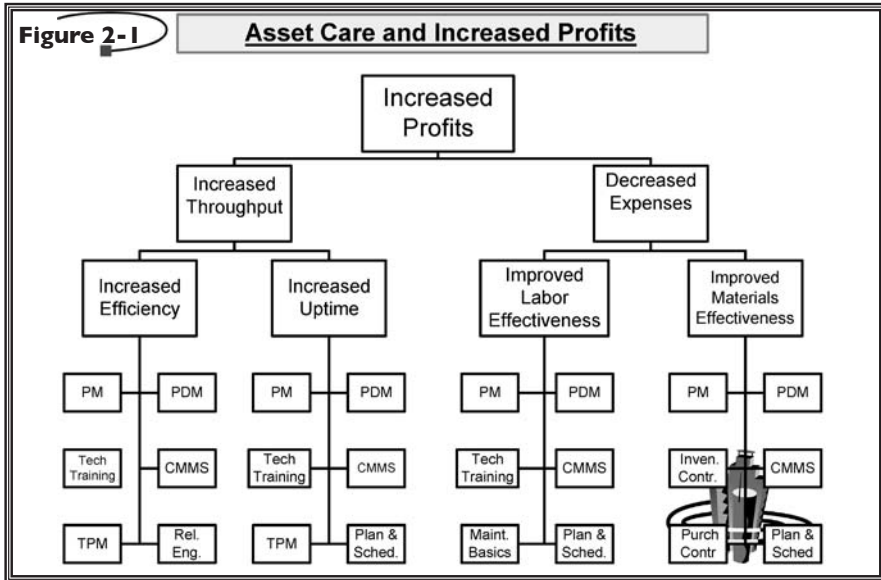
Asset management focuses on achieving the lowest total life-cycle cost to produce a product or provide a service. The goal is to have a higher ROFA than the competition in order to be the low-cost producer of a product or service. A company in this position attracts customers and ensures greater market share. Also, a higher ROFA attracts investors, ensuring a sound financial base on which to build further business.

All departments or functions within a company have the responsibility of measuring and controlling their costs, since they ultimately will impact the ROFA calculation. Only when everyone works together can the maximum ROFA be achieved. For our purposes, the maintenance function is the focus of this discussion.

How does maintenance management impact the ROFA calculation? Two indicators in particular show the impact:

Maintenance costs as a percentage of total process, production, or manufacturing costs. Maintenance costs are an accurate measure for manufacturing costs. They should be used as a total calculation, not a per-production-unit calculation. Maintenance will be a percentage of the cost to produce, but is generally fixed. This stability makes the indicator more accurate for the financial measure of maintenance, because it makes trending maintenance costs easier. If the maintenance cost percentage fluctuates, then the efficiency and effectiveness of maintenance should be examined to find the cause of the change.

Maintenance cost per square foot maintained. This indicator compares the maintenance costs to the total amount of floor space in a facility. It is an accurate measure for facilities because the cost is also usually stable. This indicator is also easy to use to trend any increases over time. If the percentage of maintenance costs fluctuates, then the efficiency and effectiveness of maintenance should be examined to find the cause of the change.



These two indicators show that traditional maintenance labor and material costs will have an impact on ROFA. However, ensuring the equipment or assets are available and operating efficiently also has an impact. The total impact of the maintenance function on ROFA is illustrated in Figure 2-1.

Overall, the goal for any company is to increase profitability. This is true whether the company is public with shareholders, or is privately owned. The maintenance or asset management function can increase profits in two main ways: decreasing expenses and increasing capacity.

Estimates suggest that 1/3 of all maintenance expenditures are wasted through inefficient and ineffective utilization of the maintenance resources. Maintenance costs consist of two main divisions: labor and materials. If a maintenance labor budget for a company is \$3M annually, and 1/3 of it is wasted, then \$1M could be saved over time. This savings would not necessarily be in headcount reduction. It may be by reducing overtime, reducing the use of outside contractors, or performing deferred maintenance without additional expenditures.

If the maintenance labor budget is \$3M annually, then studies show that the materials budget will be a similar amount. If the materials budget can also be reduced by 1/3, then the total savings for improving maintenance efficiency and effectiveness could approach \$2M per year. This savings is actually expense dollars that would not be required. Expenses dollars not used translate to profit dollars.

Be aware that when improving a reactive maintenance organization, these savings are not immediate. Time is needed to realize the total savings. Improvement of a reactive maintenance organization to a proactive, best practice organization can take from three to five years. The transition is not technically difficult; however, time is required to change the corporate culture, from one of negativity towards the maintenance function to one of treating it as a core business process.

The pure maintenance contribution to profitability is dwarfed when compared to the savings realized by increasing the capacity (availability) and efficiency of the assets being maintained. For example, equipment downtime may average 10 to 20% in some companies, or even more. Equipment that is down when it is supposed to be operating restricts the amount of product that is deliverable to the market. Some companies have gone as far as to purchase backup or redundant equipment to compensate for equipment downtime. Such purchases have a negative impact on their return on net assets indicator, lowering their investment ratings in the financial community.

Even in markets that have a volume cap, downtime increases costs, preventing a company from achieving the financial results desired, whether it is to increase profit margins or to be the low cost supplier. Yet some organizations refuse to calculate a cost of downtime and some have even said that there is no cost to downtime. They fail to consider the following factors:

- Utility costs
- Cost of idle production/operations personnel
- Cost of late delivery
- Overtime costs to make up lost production to meet schedules

The true cost of downtime is the lost sales for product not made on time. A company needs to have a clear understanding of this cost to make good decisions concerning its assets and how they are operated.

Suppose a company discovers a considerable amount of unplanned downtime for the previous year, only part of which can be corrected by improving maintenance. Some other causes for equipment downtime could be related to raw materials, production scheduling, quality control, and operator error. However, if the maintenance portion of the downtime was valued at \$38M and a 50% reduction could be achieved by improving maintenance, the savings could be \$19M. Even if only 10% of this amount was spent improving maintenance, the total savings would still be more than \$17M.

In addition to pure downtime is the cost of lost efficiency. One company examined the efficiency of its gas compressors on an off-shore operation.

It found that, due to age and internal wear, the compressors were operating at only 61% efficiency. This loss cost approximately \$5.4M annually. The overhaul would cost \$450K, including labor, materials, and downtime production losses. The decision was made to overhaul the compressors serially, in order to avoid total shutdown. The compressor overhaul was paid back in 28.1 days after restart. Furthermore, the \$5.4M in increased production was realized in the next 12 months.

Many Japanese studies (related to TPM) have shown that efficiency losses are always greater than pure downtime losses. This fact becomes more alarming when we consider that most efficiency losses are never measured and reported. In turn, many chronic problems are never solved until a breakdown occurs. Some chronic problems that have a dramatic impact on equipment efficiencies are never even discovered. Only when accurate maintenance records are kept are these problems discovered. Only then, utilizing the maintenance data combined with the financial data, can the root cause of the efficiency problem be solved.

If asset management is a focus for an organization, then the maintenance function can contribute to overall plant profitability. While cooperation and the focus of all departments and functions within an organization are needed to be successful, the maintenance department can have a dramatic, positive impact on ROFA.

Because maintenance is typically viewed as an expense, any maintenance savings can be viewed as directly contributing to profits. By achieving maximum availability and efficiency from plant assets, a plant or facilities manager ensures that a company does not need to invest in excess assets to produce its products or provide its services. Eliminating investment in unnecessary assets contributes to overall improvement to the ROFA for any company.

Because maintenance management is a core business process, it is a process than could benefit from benchmarking. The next question then asks what type of benchmarking should be utilized to gain the maximum benefits.

Types of Benchmarking

Several types of benchmarking can be employed in conducting a benchmarking project. They include:

1. Internal
2. Similar Industry/Competitive
3. Best Practice

Internal Benchmarking

Internal benchmarking typically involves different departments or processes within a plant. This type of benchmarking has some advantages in that data can be collected easily. It is also easier to compare data because many of the hidden factors (enablers) do not have to be closely checked. For example, the departments will have a similar culture, the organizational structure will likely be the same, and the skills of the personnel, labor relations, and management attitude will be similar. These similarities make data comparison quick and easy.

The greatest disadvantage of internal benchmarking is that it is unlikely to result in any major breakthrough in improvements. Nevertheless, internal benchmarking will lead to small, incremental improvements and should provide adequate Return On Investment for any improvements that are implemented. The successes from internal benchmarking will very likely increase the desire for more extensive external benchmarking.

Similar Industry/Competitive

Similar industry or competitive benchmarking uses external partners in similar industries or processes. In many benchmarking projects, even competitors are used. This process may be difficult in some industries, but many companies are open to sharing information that is not proprietary.

With similar industry/competitive benchmarking, the project tends to focus on organizational measures. In many cases, this type of benchmarking focuses on meeting a numerical standard, rather than improving any specific business process. In competitive benchmarking, small or incremental improvements are noted, but paradigms for competitive businesses are similar. Thus, the improvement process will be slow.

Best Practices Benchmarking

Best Practice benchmarking focuses on finding the unarguable leader in the process being benchmarked. This search, which crosses industry sectors and geographical locations, provides the opportunity for developing breakthrough strategies for a particular industry. The organization studies business processes outside its industry, adapts or adopts superior business processes, and makes a quantum leap in performance compared to its competitors. Being the early adaptor or adopter will give the organization an opportunity to lower costs or aggressively capture market share.

One of the keys to being successful with best practice benchmarking is to define a best practice. For example, does *best* mean:

- Most efficient?
- Most cost effective?
- Most customer service oriented?
- Most profitable?

Without this clear understanding, more resources will be needed to conduct a benchmarking project. Furthermore, the improvements will be mediocre at best.

In its GSA Office of Governmentwide Policy, the Best Practices Ad Hoc Committee developed the following definition for best practices:

Best Practices are good practices that have worked well elsewhere. They are proven and have produced successful results. They must focus on proven sources of best practices.

The committee goes on to state:

They [Organizations] should schedule frequent reviews of practices to determine if they are still effective and whether they should continue to be utilized.

This definition suggests that best practices evolve over time. What was once a best practice in the past may only be a good practice now, and perhaps in the future even a poor practice. Continuous improvement calls for movement, not business processes that are stagnant.

When looking for Best Practice companies, it must be understood that no single best practice company will be found. All companies have strengths and weaknesses. There are no perfect companies. Because the processes that are in need of improvement through benchmarking vary, the companies identified as the Best will also vary. A company that wants to insure it is benchmarking with the best needs systematic and thorough planning and data collection.

Of the three type of benchmarking, Best Practice benchmarking is superior. It provides the opportunity to make the most significant improvement; the companies being benchmarked are the best in the particular process. Best practice benchmarking provides the greatest opportunity to achieve the maximum return on investment. Most important, best practice benchmarking provides the greatest potential for achieving breakthrough strategies, resulting in an increase in the company's competitive position.

The Benchmarking Process

How does the benchmarking process flow? The following steps are necessary for a successful benchmarking project:

1. Conduct internal analysis
2. Identify areas for improvement
3. Find partners
4. Make contact, develop questionnaire, perform site visits
5. Compile results
6. Develop and implement improvements
7. Do it again.

When conducting an internal analysis, it is important to use a structured format. The analysis may be a survey, such as the one presented in Chapter 1. The goal of this analysis is to identify weaknesses in the organization, areas that need improvement. For example, using the survey in this text, an organization can find where it has the greatest deviation from the averages, then begin its benchmarking project in those areas.

Once the process areas needing improvement are identified, benchmarking partners who are markedly better in the process must be identified. Contacts then need to be made to insure that the organization is willing to participate in benchmarking.

When the partners are willing to benchmark, a questionnaire should be developed, based on the analysis conducted earlier. The questionnaire is sent to the partners; site visits are scheduled and conducted. The information gathered in this process is compiled, and put into an analysis with recommendations for changes to improve the benchmarked process. Once the changes are implemented and improvements noted, the process starts over again.

An analysis should be conducted before each benchmarking exercise, instead of relying on the previous analysis. This is due to the fact that when one process is improved, it often generates improvements to other processes. These improvements would not be noted in an older analysis. Therefore, the process chosen for the next benchmarking project may not still need improvement. The newer benchmarking project would not produce the projected improvements and, in turn, the organization may stop viewing benchmarking as cost effective.

Benchmarking is an evolutionary process. A company may start with internal partners and see incremental improvements. In turn, the process then extends to better-practice partners, whether internal to the company or external. Based on the improvements made and any additional areas identified for the next round of improvements, the process is then extended to benchmarking with the best-practice organizations.

The key to this evolution is always finding a partner who is measurably better in the process being benchmarked. Once process parity is achieved

with the partner, a new partner must be found, one who is still measurably better in the process. The benchmarking process continues until the best is found and superiority over this partner's processes is achieved.

There are NO shortcuts!

Developing a Maintenance Strategy

The focus of the maintenance function is to insure that all company assets meet and continue to meet the design function of the asset. This role of the maintenance organization within a company is discussed further in chapter 2. Best practices, as adapted to the maintenance process, can be defined as follows:

The maintenance practices that enable a company to achieve a competitive advantage over its competitors in the maintenance process

These practices (or processes) within maintenance fall in these eleven categories:

1. Preventive Maintenance
2. Inventory and Procurement
3. Work Flow and Controls
4. Computerized Maintenance Management System Usage
5. Technical and Interpersonal Training
6. Operational Involvement
7. Predictive Maintenance
8. Reliability Centered Maintenance
9. Total Productive Maintenance
10. Financial Optimization
11. Continuous Improvement

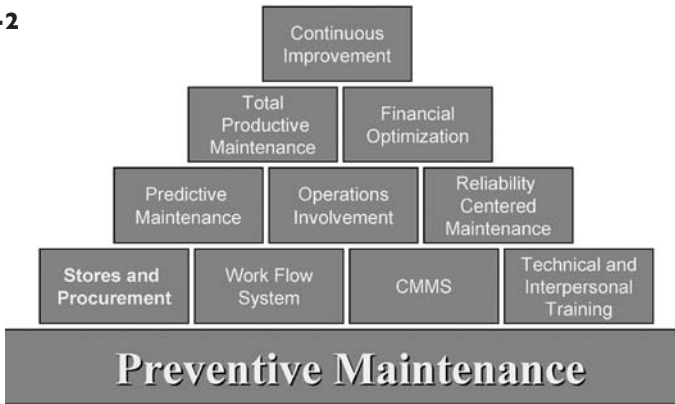
Figure 2-2 illustrates the process relationships.

I. Preventive Maintenance

The preventive maintenance (PM) program is the key to any attempt to improve the maintenance process. It reduces the amount of reactive maintenance to a level that allows other practices in the maintenance process to be effective. However, most companies in the United States have problems keeping the PM program focused. In fact, surveys have shown that only 20 percent of U.S. companies believe their PM programs are effective.

Maintenance Management Pyramid

Figure 2-2



Most companies need to focus on the basics of maintenance if they are to achieve any type of best-in-class status. Effective PM activities enable a company to achieve a ratio of 80 percent proactive maintenance to 20 percent (or less) reactive maintenance. Once the ratios are at this level, other practices in the maintenance process become more effective.

2. Inventory (Stores) and Procurement

(Note: For the purpose of this text, inventory and stores are used inter-changeably.)

The inventory and procurement programs must focus on providing the right parts at the right time. The goal is to have enough spare parts, without having too many spare parts. No inventory and procurement process can cost-effectively service a reactive maintenance process. However, if the majority of maintenance work is planned several weeks in advance, the inventory and procurement process can be optimized.

Many companies see service levels below 90 percent. As a result, more than 10 percent of requests made face stockouts. This level of service leaves customers (maintenance personnel) fending for themselves, stockpiling personal stores, and circumventing the standard procurement channels in order to obtain their materials. To prevent this situation, stores controls are needed that will allow the service levels to reach 95 to 97 percent, with 100 percent data accuracy. When this level of performance is achieved, the company can then start the next step toward improvement.

3. Work Flows and Controls

This practice involves documenting and tracking the maintenance work that is performed. A work order system is used to initiate, track, and record

all maintenance activities. The work may start as a request that needs approval. Once approved, the work is planned, then scheduled, performed, and finally recorded. Unless the discipline is in place and enforced to follow this process, data is lost, and true analysis can never be performed.

Therefore, the system must be used comprehensively to record all maintenance activities. Unless the work is tracked from request through completion, the data is fragmented and useless. If all of the maintenance activities are tracked through the work order system, then effective planning and scheduling can start.

Planning and scheduling requires someone to perform the following activities:

- Review the work submitted
- Approve the work
- Plan the work activities
- Schedule the work activities
- Record the completed work activities

Unless a disciplined process is followed for these steps, productivity decreases and equipment downtime is reduced. At least 80 percent of all maintenance work should be planned on a weekly basis. In addition, the schedule compliance should be at least 90 percent on a weekly basis.

4. Computerized Maintenance Management Systems Usage

In most companies, the maintenance function uses sufficient data to require its computerizing the collection, processing, and analysis of the data. The use of Computerized Maintenance Management Systems (CMMS) has become popular throughout the world. CMMS software manages the functions already discussed, and provides support for some of the best practices that have not yet been covered in this chapter.

Although CMMS has been used for almost a decade in some countries, results have been very mixed. A recent survey in the United States showed the majority of companies using less than 50 percent of their CMMS capabilities. For a CMMS to be effective, it must be used completely and all data collected must have complete accuracy.

5. Technical and Interpersonal Training

This function of maintenance insures that the technicians working on the equipment have the technical skills required to understand and maintain the equipment. Additionally, those involved in the maintenance functions must have the interpersonal skills to be able to communicate with other departments in the company. They must also be able to work in a team or natural work group environment. Without these skills, there is lit-

the possibility of maintaining the current status of the equipment. Furthermore, the probability of ever making any improvement in the equipment is inconceivable.

While there are exceptions, the majority of companies today lack the technical skills within their organizations to maintain their equipment. In fact, studies have shown that almost one-third of the adult population in the United States is functionally illiterate or just marginally better. When these figures are coupled with the lack of apprenticeship programs available to technicians, the specter of a workforce where the technology of the equipment has exceeded the skills of the technicians that operate or maintain it has become a reality.

6. Operational Involvement

The operations or production departments must take enough ownership of their equipment that they are willing to support the maintenance department's efforts. Operational involvement, which varies from company to company, includes some of the following activities:

- Inspecting equipment prior to start up
- Filling out work requests for maintenance
- Completing work orders for maintenance
- Recording breakdown or malfunction data for equipment
- Performing some basic equipment service, such as lubrication
- Performing routine adjustments on equipment
- Executing maintenance activities (supported by central maintenance)

The extent to which operations is involved in maintenance activities may depend on the complexity of the equipment, the skills of the operators, or even union agreements. The goal should always be to free up some maintenance resources to concentrate on more advanced maintenance techniques.

7. Predictive Maintenance

Once maintenance resources have been freed up because the operations department has become involved, they should be refocused on the predictive technologies that apply to their assets. For example, rotating equipment is a natural fit for vibration analysis, electrical equipment a natural fit for thermography, and so on.

The focus should be on investigating and purchasing technology that solves or mitigates chronic equipment problems that exist, not to purchase all of the technology available. Predictive maintenance (PDM) inspections

should be planned and scheduled utilizing the same techniques that are used to schedule the preventive tasks. All data should be integrated into the CMMS.

8. Reliability Centered Maintenance

Reliability Centered Maintenance (RCM) techniques are now applied to the preventive and predictive efforts to optimize the programs. If a particular asset is environmentally sensitive, safety related, or extremely critical to the operation, then the appropriate PM/PDM techniques are decided upon and utilized.

If an asset is going to restrict or impact the production or operational capacity of the company, then another level of PM/PDM activities are applied with a cost ceiling in mind. If the asset is going to be allowed to fail and the cost to replace or rebuild the asset is expensive, then another level of PM/PDM activities is specified. There is always the possibility that it is more economical to allow some assets to run to failure, and this option is considered in RCM.

The RCM tools require data to be effective. For this reason, the RCM process is used after the organization has progressed to the point that ensures complete and accurate asset data.

9. Total Productive Maintenance

Total Productive Maintenance (TPM) is an operational philosophy whereby everyone in the company understands that their job performance impacts the capacity of the equipment in some way. For example, operations may understand the true capacity of the equipment and not run it beyond design specifications, which could create unnecessary breakdowns.

TPM is like Total Quality Management. The only difference is that companies focus on their assets, not their products. TPM can use all of the tools and techniques for implementing, sustaining, and improving the total quality effort.

10. Financial Optimization

This statistical technique combines all of the relevant data about an asset, such as downtime cost, maintenance cost, lost efficiency cost, and quality costs. It then balances that data against financially optimized decisions, such as when to take the equipment off line for maintenance, whether to repair or replace an asset, how many critical spare parts to carry, and what the maximum-minimum levels on routine spare parts should be.

Financial optimization requires accurate data; making these types of

decisions incorrectly could have a devastating effect on a company's competitive position. When a company reaches a level of sophistication where this technique can be used, it is approaching best-in-class status.

11. Continuous Improvement

Continuous improvement is best epitomized by the expression, "best is the enemy of better." Continuous improvement in asset care is an ongoing evaluation program that includes constantly looking for the "little things" that can make a company more competitive.

Benchmarking is one of the key tools for continuous improvement. Of the several types of benchmarking practices, the most successful is Best Practice benchmarking, which examines specific processes in maintenance, compares the processes to companies that have mastered those processes, and maps changes to improve the specific process. This flow of practices in maintenance is important; understanding that benchmarking is a continuous improvement tool enhances the understanding that it is a technique employed by a mature organization, one that is knowledgeable about the maintenance business process.

Key Performance Indicators (KPIs), Benchmarking, and Best Practices

Performance indicators, or measures, for best practices are misunderstood and misused in most companies. Properly used, performance indicators should highlight opportunities for improvement within companies today. Performance indicators should highlight a "soft spot" in a company, then enable further analysis to find the problem that is causing the low indicator, and then ultimately point to a solution to the problem.

Performance indicators are valuable tools in highlighting areas that are potential processes to be benchmarked. For example, if a certain set of performance indicators show that a maintenance process, such as preventive maintenance, needs to be improved, and the internal personnel for the company can not identify the changes necessary to improve, then a benchmarking project may be the answer.

However, it is necessary to clarify that benchmarks are not performance indicators and performance indicators are not benchmarks. Using performance indicators is an internal function for a company. A benchmark is an external goal that is recognized as an industry or process standard. However, the number in itself is meaningless, unless there is an understanding of how the benchmark is derived. Understanding the enablers and success factors behind the benchmark is what is important.

Also, it must be clearly understood that there is a difference between a benchmark and the process of benchmarking. The benchmark is again a number. Benchmarking is a process of understanding a company's processes and practices, so they can be adapted or modified and then adopted by a company, in order to be superior in the process or practice being studied.

Continuous Improvement - The Key to Competitiveness

Since benchmarking is a continuous improvement tool, it should only be started if a company wants to make changes to improve. Companies can not develop the attitude that "We have always done it this way." They must be willing to change to meet the challenges of increasing competitive pressure.

Benchmarking is a continuous improvement tool that can facilitate change. As Best Practice companies are examined and their processes understood, the gap between a company's present practices and Best Practice promotes dissatisfaction and desire for change. When companies see, understand, and learn from Best Practice companies, it helps them to identify what to change and how to make the changes to maximize their return on their investment in the changes. The opportunity to witness Best Practices provides a realistic and achievable picture of the desired future. However, this takes resources, both in human and financial capital, to be successful. It is necessary to explore with the benchmarking partners, the tangible and intangible factors that combine to produce superior performance. It is also necessary to involve those people most directly connected with the business process being benchmarked, since they have to take ownership in the changed process.

Benchmarking Goals

In considering how to conduct a benchmarking project, it is necessary to review the goals of benchmarking. Benchmarking should:

1. Provide a measure for the benchmarked process
 - i. This allows for and "Apples to Apples" comparison
2. Clearly describe the organization's performance gap when compared to the measure
3. Clearly identify the Best Practices and enablers that produced the superior performance observed during the benchmarking project
4. Set performance improvement goals for the benchmarked processes and identify actions that must be taken to improve the process.

Quantifying the organization’s current performance, the Best Practice for the process, and the performance gap is vitally important. There is a management axiom that says:

If you don’t measure it, you don’t manage it.

This is true of benchmarking. There must be quantifiable measures if a clear strategy to improve is going to be developed. This details the SMART requirements for a benchmarking project. The acronym SMART means:

1. Specific – insures the project is focused
2. Measurable – requires quantifiable measures
3. Achievable – insures that the project is within a business objective
4. Realistic – focused on a business objective
5. Time framed – The benchmarking project should have a start and end date.

Gap Analysis

Gap analysis is a key component of any benchmarking project and helps that project achieve the SMART objectives. Gap analysis is divided into the following three main phases:

1. Baseline – the foundation, or where the company is at present
2. Entitlement – the best that the company can achieve with effective utilization of their current resources
3. Benchmark – the Best Practice performance of a truly optimized process

In order to utilize gap analysis effectively, the benchmarking project must be able to produce quantifiable results. All of the measures must be

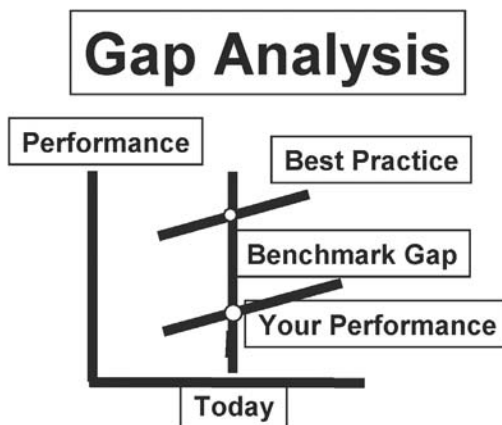
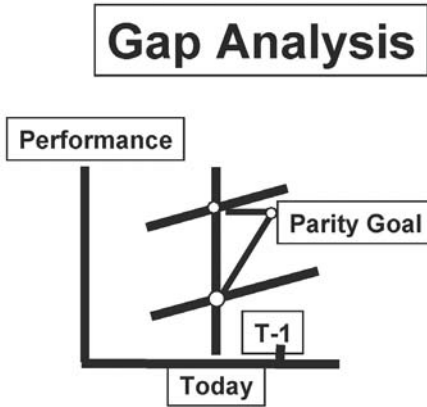


Figure 2-3



The parity goal is focused on achieving the level of performance they are currently achieving

T-1 is the time to achieve this level of performance

Figure 2-4

able to be expressed clearly and concisely so that the improvement program can be quantified.

The first step of gap analysis is to compare the company's process in quantifiable terms to the Best Practice results that were observed. It is best to plot this comparison, as shown in Figure 2-3.

The gap between the observed Best Practice and the organization's current performance is plotted on the vertical axis of the chart. The horizontal axis shows the time line. This chart highlights the need for the measures to be quantifiable if they are to be properly graphed.

The second part of gap analysis sets the time (T1) to reach what is called a current parity goal. This goal is focused on achieving the current level of performance that the Best Practice company has reached at the current time. This goal also recognizes that the Best Practice company will have made improvements during this time period and will still be at a higher level of performance (see Figure 2-4).

The next step is to set a real time parity goal. This level is reached when your company achieves parity on the benchmarked process with the Best Practice company. It is highlighted in Figure 2-5 as T-2. The final goal is the leadership position which occurs when your company's performance in the benchmarked process is recognized as having exceeded your partner's performance. This level is noted as T-3 in Figure 2-5. At this point, your company will be recognized as the Best Practice company for the benchmarked process.

If a company is to effectively use gap analysis, all of the parameters must be quantifiable and time framed. If not, gap analysis will be meaningless

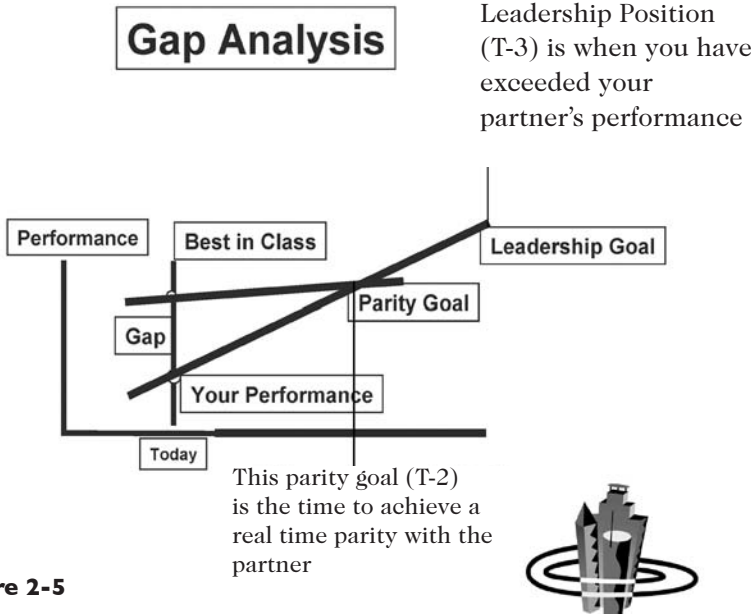


Figure 2-5

The Benchmarking Process

What steps should be used to insure that a benchmarking process is quantifiable? When the following checklist is used, it allows for the benchmarking process to be successful. If a disciplined approach is not followed, benchmarking is unlikely to produce any long-term results.

- A. Plan
- B. Search
- C. Observe
- D. Analyze
- E. Adapt
- F. Improve

The checklist can then be further expanded into the following detail.

A. Plan

- 1. What are our maintenance mission, goals, and objectives?
 - a. Does everyone involved clearly understand the maintenance business function?
- 2. What is our maintenance process?
 - a. What work flows, business process flows, etc., are involved?
- 3. How is our maintenance process measured?
 - a. What are the current KPIs or performance indicators?

4. How is our maintenance process perceived as performing today?
 - a. What is the level of satisfaction for the service that maintenance performs?
5. Who is the perceived customer for maintenance?
 - a. Is the customer operations or the shareholders/owners? The answer to this question can prove insightful in determining the level of understanding of maintenance within the organization.
6. What services are expected from the maintenance function?
 - a. What service does maintenance perform?
 - What is outside contracted?
 - What isn't being done that needs to be done?
7. What services is the maintenance function prepared to deliver?
 - a. Is maintenance capable of more?
 - Are the staffing, skill levels, etc. at the correct level to perform the services?
8. What are the performance measures for the maintenance function?
 - a. How does maintenance know if it is achieving its objectives?
9. How were these measures established?
 - a. Were they negotiated or mandated?
10. What is the perception of our maintenance function compared to our competitors?
 - a. Internal perceptions – worse than, as good as, or better than?

B. Search

1. Which companies are better at a maintenance process than our company?
 - a. Utilize magazine articles and internet sites.
2. Which companies are considered to be the best?
 - a. Consider the NAME Award: <http://www.nameaward.com>
3. What can we learn if we benchmark with these companies?
 - a. Understand their Best Practices and how they could help our company.
4. Who should we contact to determine if they are a potential benchmarking partner?
 - a. Look for a contact in the article or on the internet site.

C. Observe

1. What are their maintenance mission, goals, and objectives?
 - a. How do they compare to our company's?
2. What are their performance measures?
 - a. How do they compare to our company's?

3. How well does their maintenance strategy perform over time and at multiple locations?
 - a. Are their current results an anomaly or are they sustainable?
4. How do they measure their maintenance performance?
 - a. Are their measures different from our company's?
5. What enables their Best Practice performance in maintenance?
 - a. Is it the plant manager, corporate culture, etc.?
6. What factors could prevent our company from adopting their maintenance policies and practices into our maintenance organization
 - a. How would we describe our culture, work rules, maintenance paradigm, etc.?

D. Analyze

1. What is the nature of the performance gap?
 - a. Compare their Best Practice to our practice.
2. What is the magnitude of the performance gap?
 - a. How large is the benchmark gap?
3. What characteristics distinguish their processes as superior?
 - a. Detail the enablers we discovered.
4. What activities do we need to change to achieve parity with their performance?
 - a. What is the plan for change?

E. Adapt

1. How does the knowledge we gained about their maintenance process enable us to make changes to improve our maintenance process?
 - a. What do we need to do to improve?
2. Should we adjust, redefine, or completely change our performance measures based on the Best Practices that were observed?
 - a. What are the differences and how can we benefit by the change?
3. What parts of their Best Practice maintenance processes would have to be changed or modified to be adapted into our maintenance process?
 - a. We need to be an adaptor, not a copy cat.

F. Improve

1. What have we learned that would allow our company to achieve superiority in the maintenance process that was benchmarked?
 - a. What can we change to eventually achieve the superiority position?

2. How can these changes be implemented into our maintenance process
 - a. Develop the implementation plan.
3. How long should it take for our company to implement these changes
 - a. Prepare a timeline for the implementation plan.

To gain maximum benefits from benchmarking, a company should only conduct a benchmarking exercise after it has attained some level of maturity in the core competency being benchmarked. Clearly, a company would have to have some data about its own process before it could perform a meaningful comparison with another company. For example, in equipment maintenance management, common benchmarks are:

1. Percent of maintenance labor costs spent on reactive activities versus planned and scheduled activities.
2. Service level of the storeroom--percent of time the parts are in the storeroom when needed.
3. Percentage of maintenance work completed as planned.
4. Maintenance cost as a percentage of the estimated replacement value of the plant or facility equipment.
5. Maintenance costs as a percentage of sales costs.

Without accurate and timely data and an understanding of how the data is used to compile the benchmark statistics, there will be little understanding of what is required to improve the maintenance process. This is true whatever process is benchmarked.

When partnering with companies considered to be the best in a certain aspect of a competency, it is also important to have an example of an internal best practice to share with them. Benchmarking requires a true partnership, which includes *mutual* benefits. If you are only looking and asking during benchmarking visits--with no sharing--what is the benefit to the partners?

The final step to ensure benefits from benchmarking is to use the knowledge gained to make changes in the competency benchmarked. The knowledge gained should be detailed enough to develop a cost/benefit analysis for any recommended changes.

Benchmarking is an investment. The investment includes the time and money to do the ten steps described earlier. The increased revenue generated by the implemented improvements pays for the investment. For example, in equipment maintenance, the revenue may be produced through

increased capacity (less downtime, higher throughput) or reduced expenses (efficiency improvements).

The revenue is plotted against the investment in the improvements to calculate the return on investment (ROI). To ensure success, the ROI should be calculated for each benchmarking exercise.

Benchmarking Code of Conduct

1. Keep it legal.
2. Be willing to give any information you get.
3. Respect confidentiality.
4. Keep the information internal.
5. Use benchmarking contacts.
6. Don't refer without permission.
7. Be prepared from the start.
8. Understand your expectations.
9. Act in accordance with your expectations.
10. Be honest.
11. Follow through with commitments.

While this list of suggestions for the code of conduct may seem to be common sense, it is surprising the number of companies that fail to apply them. This results in everything from minor disagreements between individuals to major legal battles. Recognizing that the other companies are your partners and treating them as such is key to successful benchmarking relationships.

Traps to Benchmarking

When benchmarking is used properly, it can make a major contribution to the continuous improvement process. However, it can also be completely devastating to a company's competitive position when used improperly. Some of the improper uses of benchmarking include:

1. Using benchmarking data as a performance goal. When companies benchmark their core competencies, they can easily fall into the trap of thinking a benchmark should be a performance indicator. For example, they focus all of their efforts on cutting costs to reach a certain financial indicator, losing focus on the real goal.

A company receives greater benefits when the tools and techniques used by a partner to achieve a level of performance are understood. This understanding allows the company not only to reach a certain number, but also to develop a vision of how to achieve an even more advanced goal.

By focusing on reaching a certain number, some companies may have changed their organizations negatively (e.g., by downsizing or cutting expenses). However, they may have also removed the infrastructure (people or information systems) and soon find they are not able to sustain or improve the benchmark. In such cases, benchmarking becomes a curse.

2. *Premature benchmarking.* When a company attempts to benchmark before the organization is ready, it may not have the data to compare with its partners. Therefore, someone makes a “guesstimate” that does the company no good.

The process of collecting data gives an organization an understanding of its core competencies and how it currently functions. Premature benchmarking will lead back to the first trap--just wanting to reach a number. Companies that step into this trap become “industrial tourists.” They go to plants and see interesting things, but don’t have enough of an understanding to apply what they see to their own businesses. The end results, then, are reports that sit on shelves and never contribute to improved business processes.

3. *Copycat benchmarking.* Imitation benchmarking occurs when a company visits its partners and, rather than learning how the partners changed their businesses, concentrates on how to copy the partners’ current activities. This practice may be detrimental to a company because it may not have the same business drivers as its benchmarking partners. Also, there may be major constraints to implementing the partner’s processes. Such constraints might include incompatible operations (7 days @ 24 hr/day versus 5 days @ 12 hr/day), different skill levels of the work force, differences in union agreements, different organizational structures, and different market conditions.

4. *Unethical benchmarking.* Sometimes a company will agree to benchmark with a competitor and then try to uncover proprietary information while on the site visit or by use of the questionnaire. Clearly, this kind of behavior will lead to problems between the companies and virtually ruin any chance of conducting a successful benchmarking exercise at a later date.

A second type of unethical benchmarking entails referring to or using the benchmarking partners’ names or data in public without receiving prior permission. This, too, will damage any chance for ongoing benchmarking between the companies. Even worse, the bad experience may prevent management from ever commissioning further benchmarking exercises with other partners.

Other Pitfalls

Not every company is ready for benchmarking. However, companies should not avoid benchmarking just because of a previous bad experience or because they have the attitude of “We are already the best” or “We are different than everyone else.” Companies in which responsible individuals have such a mindset will have little chance of improving.

Benchmarking is valuable because trying to reinvent the wheel is an expensive way to try to make improvements. Once a company has the proper view of the benchmarking process, and disciplined guidelines are established and followed, desired improvements should follow. However, if the company does not benchmark for the right reasons, benchmarking efforts will become a curse.

Procedural Review

Benchmarking opportunities are uncovered when a company conducts an analysis of its current policies and practices. Benefits are gained by following a disciplined process, composed of ten steps:

1. Conduct an internal audit of a process or processes.
 - a. Education of key personnel in benchmarking processes is crucial at this point. They must fully understand and support the process.
2. Highlight potential areas for improvement.
 - a. This requires understanding the cost of benchmarking compared to the financial benefits that will be derived. This should be presented in a return-on-investment business case.
3. Do research to find three or four companies with superior processes in the areas identified for improvement.
4. Contact those companies and obtain their cooperation for benchmarking.
5. Develop a “pre-visit” questionnaire highlighting the identified areas for improvement. (See step 2.)
 - a. This step requires a carefully planned approach to benchmarking. You then will need the discipline to adhere to the plan.
6. Perform the site visits to your three or four partners. (See step 3)
 - a. An interim report should be prepared after each visit and presented to the executive sponsor.
7. Perform a gap analysis on the data gathered compared to your company’s current performance.
8. Develop a plan for implementing the improvements.
 - a. The plan should include the changes required, personnel involved, and the timeline

9. Facilitate the improvement plan.
 - a. One or more members of the benchmarking project team should oversee the implementation of the plan to insure the changes are properly implemented.
10. Start the benchmarking process over again.

Benchmarking helps companies find the opportunities for improvement that will give them a competitive advantage in their marketplaces. However, the real benefits from benchmarking do not occur until the findings from the benchmarking project are implemented and improvements are realized.

Final Points

1. It is necessary to explore the tangible and intangible factors that combine to produce a superior performance and involve those people most directly concerned in the activity being examined.
2. Benchmarks are not the end-all. A benchmark performance does not remain a standard for long. Continuous improvement must be the goal.

After having examined the benchmarking process, it is necessary to clearly understand the process being benchmarked. Chapters 3 through 11 will examine all aspects of the maintenance management function. These chapters will further highlight the methodology behind the survey that was included in Chapter 1. Chapter 12 will then present some current industry benchmarks for maintenance. With the understanding of both the benchmarking and maintenance processes, any company should be able to conduct a successful benchmarking project.