

How Understanding the Total Cost of Ownership of Your Instrumentation or Equipment Can Reduce Costs, Increase Performance and Improve Workforce Productivity

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Key Words

- Asset Management
- Service Management
- Outsource Model
- Total Cost of Ownership

In the competitive, highly regulated business climate that exists in the life science industry, companies are challenged to find creative ways to lower their costs without compromising the goal of producing high quality products, while maintaining regulatory and compliance standards required by the industry. Many companies are facing significant challenges to their profitability due to increasing regulatory pressures, price controls, rising quality expectations, and competition. Considering the pressures of drug patent exclusivity, stronger generic competition and rising R&D costs, it's more important than ever to deliver a sustainable competitive advantage by investing in core business competencies and optimizing the management of non-core activities. One such non-core activity is the lifecycle management of capital assets required to support your business operations – from acquiring the asset, maximizing the operation, maintaining the performance and determining when to properly dispose of it.

What is Total Cost of Ownership?

To manage and optimize the lifecycle cost of your assets, one must first understand the concept of total cost of ownership (TCO) and the factors that contribute to it.

TCO is a concept used to represent all of the costs, including direct and indirect costs, associated with owning capital assets required to support your business operations. For the purposes of this article, we are going to focus on laboratory assets – in particular, scientific instruments and equipment. TCO seeks to identify and quantify all of the people, process and tool-related expenses needed to operate and maintain instruments and equipment for the laboratory, so that organizations can make more informed business decisions on new purchases and disposition based upon financial and nonfinancial factors.

Three factors that contribute to TCO are the process factor, product (or asset) factor, and productivity factor, which are categorized in Diagram 1, to highlight the direct and indirect costs associated with these factors during each phase of the instrument and equipment lifecycle. Thinking in these TCO terms should help to provide a clearer understanding of all of the costs associated with acquiring, operating, maintaining and disposing of assets.

This TCO understanding is crucial for effective management of costs, which includes optimization of assets. It is the first step in getting control of the asset management process to implement strategies to help further support the organizations' goals for saving money, maintaining compliance and accelerating the research, development and manufacture of goods.

Defining Direct and Indirect Costs

Direct costs are usually those costs that are planned within a budget, resulting in purchase orders being generated and invoices being paid. These costs are easier to identify and track than indirect costs. Indirect costs are typically hidden and not included in a budget, making them more difficult to measure and quantify, and often are not factored into the total cost of instrument and equipment ownership. An example of a direct cost is the purchase of an instrument or equipment. However, if the purchase is not planned or hidden due to the failure of another instrument or equipment, then it becomes an indirect cost.

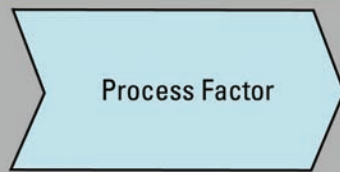
Depending upon a company's instrument and equipment maintenance strategy (preventive maintenance, corrective maintenance, training, upgrades and application support, regulatory and quality compliance (FDA, cGMP, ISO, etc.) consumables, accessories, and supplies), these costs can fall into either direct or indirect cost categories. A proactive maintenance strategy has more of these costs fall into the direct cost category by utilizing a planned maintenance strategy leveraging asset and service management, supplier management, support plans and preventative maintenance programs. On the other hand these costs can also fall into the indirect cost category when a reactive maintenance strategy is utilized. A reactive maintenance strategy is more reliant on corrective maintenance, which means you pay for services as the failure events occur or as the maintenance is needed. Due to the fact that these indirect costs are unplanned, many of the expenses that result can be fairly extensive but hidden to an organization due to the lack of visibility in the budget and the fact that operational costs are not as easily tracked. An instrument or equipment failure quickly becomes expensive to an operation due to the productivity loss, the cost of idle employees or system operators, the administrative labor costs to coordinate repair services and contact suppliers, track field service reports, and the possible payment of overtime to make up for lost production; or as mentioned above, the possible purchase of a new instrument or equipment.

The Three "P" Factors

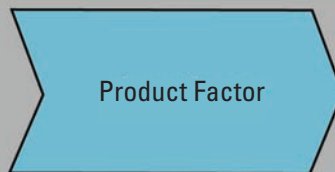
There are three primary factors that need to be considered as part of TCO evaluation and management. (Diagram 1) Placing instrument and equipment lifecycle costs into these three categories allows for a more strategic view and analysis of the costs. It is with this view that critical success factors can be identified and a plan can be implemented to reduce TCO.

Diagram 1

$$\text{Total Cost} = \text{Process Factor} + \text{Asset Factor} + \text{Productivity Factor}$$



- Administrative & Management Cost Change Over Baseline
- Personnel Cost



- Product Cost
 - Acquisition Price
 - Operating Cost
 - Service Cost
 - Disposition Revenue
- Personnel Cost



- Throughput Improvement Factor Over Baseline Performance
- Personnel Cost

Total Cost of Ownership (TCO): To reduce TCO look at all three (3) factors holistically to streamline administrative and management processes, rationalize your asset base, acquisition decisions and operating costs, as well as improve productivity through optimal service delivery; Consider outsourcing the management of your assets and your services to focus on your core competencies.

The Process Factor - Table A

Lack of good processes can have a major negative impact on the TCO in an organization. Often, the additional costs associated with poor or insufficient processes are extremely difficult to measure resulting in a total lack of visibility to how much potential money is being lost. Poor process management contributes to projects taking longer to complete or never being completed, incremental resources being allocated to help support projects, workload being redistributed to other personnel, and reprioritization of other initiatives and activities. On the other hand, though, good processes that are well executed enable organizations to more effectively utilize resources, leverage automation and track key performance metrics and results for continuous process improvement. This is the reason many companies have adopted LEAN, Six Sigma and other practical process improvement initiatives.

The primary indirect costs associated with the process factor are related to management and administrative personnel. These people supply the labor required to develop, implement, maintain, measure and continuously improve upon the organization's processes. The secondary indirect costs are the infrastructure and system components that serve as the backbone of the organization to support these processes.

Does your organization have a process for managing the lifecycle of instrument and equipment ownership? Does your organization know what the costs are?

Do you have a process for determining when a new instrument or equipment needs to be purchased? Do you

have the data to make the proper assessment on which model to buy from a particular manufacturer? Do you know when an existing instrument or equipment will be retired, so that you can plan for a new instrument in your budgeting process? Do you know how well the manufacturer has serviced your current instrumentation inventory? Do you know if the scientist or the end user will need be trained on the technique or the application? Do you have a coordinated process between strategic sourcing, finance, lab management and engineering, so that everyone knows that the inventory needs to be updated and the instrument needs to be tracked and serviced? Is there a centralized service request process or do individuals within the lab call the various manufacturers? Do you know if the preventative maintenance that was included in the service contract has been performed? Do you know what parts were replaced and if they came with a warranty? Do you know when your instruments and equipment will become obsolete and no longer supportable? Do you have a process for managing idle or surplus assets? Do you know how much it's costing you to retain a storage warehouse?

If the answer to any of these questions is no, then you have hidden costs that can be eliminated and various opportunities for streamlining and improving processes. In the productivity factor, you will learn about the importance of establishing key performance metrics, which can help drive continuous process improvements.

Product (Asset) Factor - Table B

Unreliable instruments and equipment, as well as

Process Factor (Costs related to managing and administering instrument & equipment ownership processes)			
Acquisition	Operation	Maintenance	Disposition
Needs Assessment	Continuing Education	Service Request Management	Redeployment
Planning & Budgeting	Inventory / Information Management	Service Event (PM) Management	Liquidation
Vendor Selection (RFP)	Compliance	Documentation Management	Disposal
Financing	Consumables Management	Data Management	Waste Management
Implementation / Training	Asset Tracking / Utilization	Retirement Management	Donation
Strategic Sourcing	Lab Management	Engineering / IT / Facilities	Facilities

Enterprise Asset & Service Management System Costs - Software, Hardware, Implementation and Support

Table A

Key Words

- Asset Management
- Service Management
- Outsource Model
- Total Cost of Ownership

Product Factor (Costs related to owning instruments & equipment)			
Acquisition	Operation	Maintenance	Disposition
Instrument Purchase Price	Education / Training Costs	Cost of Repairs	Cost of Disposal
Financing Costs	Accessories	Cost of Preventative Maintenance	Storage Costs
Installation Costs	Consumables	Service Contract Costs	Revenue from Sale / Auction
Qualification Costs	Upgrades / Software Costs	On-Demand (Pay-Per-Use) Costs	Write-Offs
	Chemicals / Reagents	Parts Costs	Taxes
	Operator Costs	In-House Engineer Labor Costs	

Table B

novice operators, can also have a negative impact on the TCO. If an instrument fails to perform as intended, the failure can be attributed to either the instrument or the operator. Depending upon the type of instrument and the environment, a laboratory department may have a back-up instrument that can be used when workload or tasks need to be shifted quickly. Unfortunately, the back-up instrument could be from a different manufacturer or have a different system configuration for which the operator might not be familiar. Alternatively, identifying and standardizing on the highest quality instruments and ensuring that operators are trained and competent to work with them can contribute greatly to an organization's ability to innovate new products.

The primary direct costs associated with the product factor are the easiest to quantify because they are usually included in the budget (assuming some of the processes referenced above are in place). These are the initial costs or prices that an organization incurs to buy instruments and equipment, consumables, reagents and various services. The secondary indirect costs are the costs of the individuals – scientists, researchers, technicians - responsible for utilizing the instruments and equipment in their daily research and development efforts. These individuals are essential components of a life sciences company and rely heavily on both the processes within an organization and the products (in this case, the instruments) to be successful.

As an organization do you know how much you are spending on your instruments and equipment throughout their lifecycle? Do you know if the operators have received the proper training?

How many different suppliers (manufacturers and service providers) are you managing? Are you buying and standardizing on the best instruments available? Are you, subsequently, buying and standardizing on the supplies, consumables and re-agents? Are you leveraging your purchasing power and volume? Have you compared the ownership of an instrument from one manufacturer to another to know if you're getting the best value for your money? Are your operators trained on how to use all of the instruments? Do you know if it's going to cost more to service a particular instrument than if you were to purchase a new instrument? Should you purchase the upgrade or buy a new instrument?

If the answer to any of these questions is no, then you

have hidden costs that can be eliminated by rationalizing your asset base and reducing the number of suppliers with whom you do business. These activities will not only maximize your purchasing power and increase your operator performance, but also reduce some of the management and administrative burden referenced in the processes above.

Productivity Factor - Table C

The productivity factor is often overlooked because it is the most difficult to measure and quantify. However, it is also the most important factor of the three. The productivity factor is critical in determining how well you're managing instruments and equipment according to the previous two factors. This will provide a baseline from which to improve the efficiency and throughput of your administrative, scientific and technical personnel, as well as the performance of your instruments and equipment.

To measure the productivity factor, an organization must develop a scorecard with five to six internal key performance metrics that are in alignment with the organization's goals and linked to individual performance objectives. A baseline should be established and benchmarked against industry standards. Benchmarking can take place internally with a different site or division in your organization or externally through consultative organizations. Regardless, the productivity factor is dependent upon effective benchmarking. This is because productivity is relative. It's relative to how well you performed in the past, how productive you are today and how you compare against other organizations, and in particular, the competition. Then, the organization must identify critical success factors to be put in place to achieve any specific performance metric objectives.

The primary indirect costs associated with the productivity factor are related to instrument and equipment performance, such as reliability, uptime, sample throughput, and utilization, as well as administrative personnel transactions, operator utilization, and service provider performance. The secondary indirect costs are software functionality requirements needed to capture the data and generate these key performance metrics and reports. As an organization do you know how well your instruments and your people are performing from a productivity perspective?

Productivity Factor (Costs related to benchmarking and measuring Key Performance Metrics)			
Acquisition	Operation	Maintenance	Disposition
Cost per Purchase Order	Operator Utilization	Uptime / Downtime (Elapsed Time To Repair ETTR)	# of Idle / Surplus Assets
Cost per Invoice	# of Samples per Instrument	Response Time	# of Assets Redeployed
# of Assets by Manufacturer	# of Samples per Operator	Mean Time To Repair	# of Assets Sold
# of Assets by Instrument Classification	Asset Utilization	Same Day Fix Rate	
	Training Time	PM Completion Rate	
	Mean Time Between Failure	In-House Labor Utilization	

Enterprise Asset & Service Management System Functionality - Capture Data and Generate Reports

Table C

Key Words

- Asset Management
- Service Management
- Outsource Model
- Total Cost of Ownership

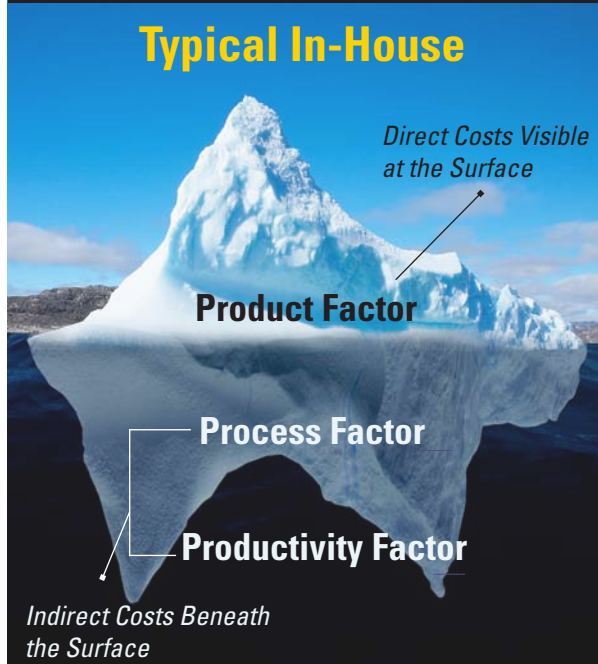
Do you have key performance metrics for measuring the productivity of your personnel and the performance of your instruments and equipment? Do you have internal business processes to measure the number of activities and transactions by employee? Do you know how many instruments or equipment of the same classification have been purchased from different manufacturers? Do you know the failure rate of your instruments by a specific manufacturer? Do you know how efficient your operators are? In a given month or year, do you know the utilization rate or sample throughput rate of certain instruments, so you can justify the purchase of an additional instrument? Do you know how often assets are being utilized to make decisions on how much preventative maintenance (PM) should be rendered? Do you know how well your service providers are performing? Do you know what your PM completion rate is? Do you know if PM's are being delivered on-time? Do you know how well your in-house engineers perform relative to your other service providers? Do you know how many idle or surplus assets are resident in the organization? Do you know if there are opportunities for redeploying some of those assets internally?

If the answer to any of these questions is no, then you have hidden costs that can be eliminated by identifying key performance metrics, establishing a baseline and determining performance goals to be achieved by implementing certain critical success factors. These metrics will not only provide the organization with visibility to productivity, but will also provide the information needed to make more informed business decisions, which will have major positive impacts on the process and product factors.

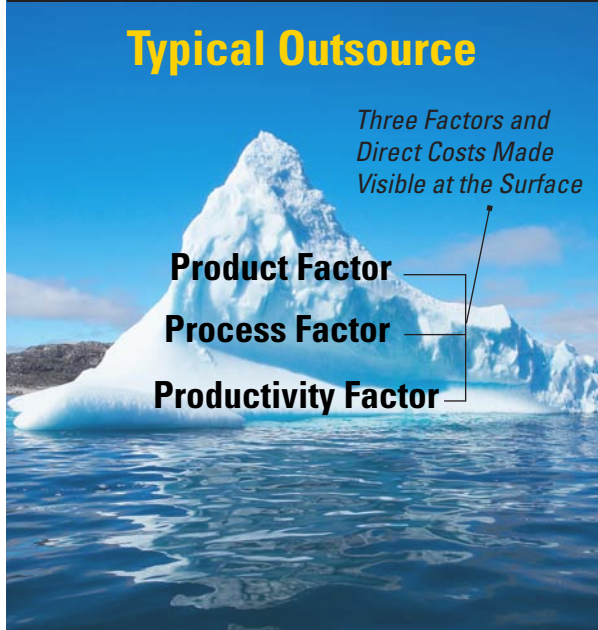
Summary

Organizations can save money, increase instrument performance and improve workforce productivity by understanding the lifecycle costs associated with instrument and equipment ownership and by implementing effective, proactive strategies and tactics to optimize the three factors. The three factors – process, product and productivity – can be broken down into the four phases of the instrument and equipment lifecycle – acquisition, operation, maintenance and disposition – and can be evaluated by analyzing the people, processes and tools used to support the phases. Each factor and each business decision made in each one of the phases has an impact on the other factors. Companies who are successful in looking at TCO holistically will improve their profitability and sustain a competitive advantage over their competition.

Total Cost of Ownership: In-House Maintenance Model vs. Outsource Asset & Service Management Model



Total Cost of Ownership: In-House Maintenance Model vs. Outsource Asset & Service Management Model



An outsourced, integrated asset & service management solution provides visibility to the maintenance costs of all three "P" factors and enables improvements in profitability.

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